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Position Paper on Visions

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IST Vision and Foresight

The major concern that I have with the EU IST Programme is the apparent premise that it is based on, namely the notion of the "information society" as a new, modular and reified concept. Within the conceptual framework(s) that I work with, none of these assumptions are justified. There have been many information societies in the history of the world, 5th century Athens, medieval Florence, etc. Exactly how society will both shape and react to the ongoing changes in technology is also an open-ended question. The issue is not simply how Europe "reacts to" some set of technical and economic forces, but how we as a society, having agreed on some of the central (desired) features of our society, can evolve an agenda that can help shape the future direction of technologies-in-use.

The future is a direction, not a place, as some have argued, and this means that we should not assume a position of technological determinism, where we must simply try to "react to" external forces, but can actively shape them to our needs. By this I am not implying that we in Europe have the power to directly change large scale economic and technical forces that are currently transforming aspects of Western industrialised society, but we should pay attention to how we accommodate them into our everyday work lives. There is no single model of how this co-adaptation of technology and society can and will take place, but if we start out from an assumption that all we can do is "prepare for" or "react to", some posited "information society" as if it were some immutable object that is about to be unleashed on our society, then I think we will have missed a myriad of opportunities for adapting aspects of the technologies to our local needs. Before that process can be begun, we need to encourage people to reflect on, and understand their current social, economic situation, and start to envision ways in which the technology might assist them in their endeavours. In my view, we will get nowhere if we think the issues we have to deal with in discussing the "information society" are primarily technological, - rather, they are economic and social.

Given that we need to address the kind of society that we wish to live in, albeit taking into account the rapidly changing technical infrastructure that is affecting many aspects of our lives, surely the kind of debate we need to be fostering is one that involves human, social and economic factors, informed by current and foreseen technical developments, and not one that is dictated by technology alone. If we accept this, then the lack of people who cover the human, psychological, social, and economic aspects of our society on many IST committees seems surprising. So I would like to see psychologists, sociologists, economists, geographers, philosophers, cultural studies commentators, theologians, social workers, historians, musicians and especially some representatives from disadvantaged sectors of society (elderly, disabled, ...) involved, not out of any sense of simply trying to be populist, but out of a genuine feeling that it is exactly people with these kinds of backgrounds that can help provide visions of possible futures for our society, and how the new technologies might affect - and indeed, *effect* - these visions. In my opinion, much of the debate about the "information society", whether it occurred 25 years ago (e.g. the EU FAST Programme initiative on the Information Society (1980I in which I was involved), or currently, is premised on a very

narrow view of how innovation and societal transformation actually occurs, with a fixation on the technology itself, and not on the other forces that shape that technology in use.

Technology Perspective

In a recent EU IST roadmap project (COCONET) in which I was involved, some themes for furher research were listed:

Theme 1: Context modelling and integration
Theme 2: Co-operative, human-centered, knowledge-supported environments
Theme 3. Enabling technologies
Theme 4. New models for co-operative work and organization

While certainly, research is needed on all these topics, the more crucial topic is that involving the theoretical frameworks for understanding human, economic, social and cultural aspects of our lives, and the technological infrastructures that might support these activities. Despite the rhetoric concerning the Information Society and the scenarios of ambient intelligence, what is remarkable is how little human beings have changed their goals, aspirations and even activities over the past half-century. New technologies are appropriated to fit into these more enduring concerns, of working, learning, meeting friends, searching for meaning in our lives. We need a rich understanding of the human, social and cultural world in order to design technological artefacts and environments that people find useful, usable and engaging. We should learn from the failures of certain kinds of pro-active, technology-push, applications. People do not want to be inundated with "information". Their needs change depending on the situation they are in, so it is difficult to satisfy their needs simply by means of personal profiles or adaptive systems. Again, playing devil's advocate, I would strongly urge that developers explore design spaces that do not assume advances in machine intelligence, nor detailed user models. After a period heralding artificial worlds and Virtual Reality, we have re-connected with our bodies, our experience of objects, and our physical world, as witnessed by the interest in embodied interaction, in the experience of technology, and in the role of place (not simply space).

IST Policies and Strategies around the world

I believe that Europe has a real opportunity to develop a distinct approach to what might be loosely termed "human-centred computing". This is because of its history and cultural diversity, and its rich tradition in several fields, including anthropology and design, which I believe will play an increasingly important role in further technological developments. It is my belief that there needs to be significant research work to provide more integrated conceptual frames for understanding human activity in the world, which can serve as an inspiration and motivation for developing design scenarios involving "ubiquitous technology" that can in turn orient technological developments. We are beginning to see the emergence of an approach to technology that is informed by an understanding of our social and cultural world. This can be seen in our developing understanding of how work gets done, of the importance of human networks, of how knowledge is not a thing to be delivered, of what motivates people. We need to build on this understanding, rather than ignore it.

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Where will the next paradigm shifts occur?

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In order to address the issue of where, when and how an ICT paradigm makes way for another and make sure that robust conclusions are reached it is necessary to tackle the question of interdependence at large. Hence I stress that a relevant starting point is: how related are technological paradigm shifts inside the realm of Information Society Technologies to the dynamics of the overall techno-economic paradigm spreading across economies? In particular, to which extent can we consider the "internal" pattern of technological development (e.g. from one generation of wireless infrastructure / systems to the next) insulated from socio-economic developments to the point of being an endogenous process?

I argue that an analysis of contemporary economies through the lens of the techno-economic paradigm (as defined in the Freeman - Perez literature) provides us with a useful tool to gain a more complete understanding of ICT technological dynamics and is the required check to balance unconstrained technological determinism, while at the same time providing an explanation of the diffusion of such a perspective in the recent decades.

By doing so the lessons from the past cycles of industrial revolutions, social reshaping and international centrifugal diffusion - all premised on paradigmatic revolutions in general purpose technologies (Bresnahan and Trajtenberg 1995; Jorgenson 2001) - can help us imagine the next future in core (post-)industrialised countries and then in peripheric economies as the techno-economic wave ripples through ebbs and tides.

In particular, the evolution of generations of wireless infrastructures has so far taken place during the installation period through the phases of irruption and frenzy while noticeably halting, on the verge of the coming into place of 3G, as the decoupling of financial capital from ICT industries lead to a reassessing of expectations. The theory goes, according to Perez (2002), that a rematching between social institutions and the recently bloomed, boomed and bust techno-economic models in core and then peripheral countries is the key to a fruitful deployment period through synergy and maturity phases. But how can we translate that into concrete indications for assessing the potential and shape of 4G wireless systems?

Linear (cellular) evolutions of 4G following the trajectories delineated through the open, de jure standard setting procedures enshrined in the development of 2G and 3G wireless systems face derailing by the pressure posed by the immediate WiFi/WLAN/WIMAX technological development and deployment side by side with 3G.Moving back one wireless generation ago we can relate to the work of the RACE 2 MONET project, which contemplated synergy between UMTS and ISDN; we are not yet in a position to determine in hindsight whether at least one of the two technologies will gain diffusion as wide as LAN wireline internet access in its various shapes or 2G wireless telephony. If the answer to such a question were to be negative then it would become imperative to analyse how efforts towards paradigm synergy risk an information cascade (Arthur 1989; Bannerjee 1992) effect which can hinder both technological deployments if involving large scale kind investments.

It is early to draw conclusions on this line for the prospective linear / immediate 4G competition / synergy but what can be underlined is that a substantial detachment from the final recipients of the technology, whether considered as consumers or citizens, has been so

far a common feature of advancements in wireless telecommunications (leaving aside organised users). Consumer demand (and expectations) is in fact filtered through network operators and systems suppliers; similarly for citizens, whose participation to IST policies through democratic representativity fades from the national to regional and international bodies. This is a factor increasing the room for surprise and the potential for change in the technology, business and regulatory arenas.

Technology and Mobility

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Is the information society already here?
Part of the motivation for eEurope was the perception that Europe was 'lagging behind' the USA, and that if it did not take action then Europe would miss out in reaping the full economic and social benefits afforded by ICTs. Surveys typically show that although Europe is making progress towards the Information Society it is still behind the USA on many measures eg Statistical Indicators Benchmarking the Information Society.

Nevertheless, most European organisations are online to some degree and more than half of the adult population uses the Internet on a regular or occasional basis. One in three uses e-mail, one in five looks for health information online, one in five has done eShopping and one in seven regularly does eBanking.

But Europeans are less likely to have home access to the Internet (about 40% compared with 60% of Americans), and fewer Europeans have a fast broadband connection. Europeans also don't use the Internet as much or as regularly as Americans. While almost one in three Europeans had sent or received an email in the previous month, three in five Americans had done so. Having said that, Europeans in full-time education are just as likely as their American counterparts to use the Internet regularly. And although 'digital literacy' levels – the ability to use computers and the Internet – are higher in the USA, the gap between the US and Europe is not so great for young people.

But there is good news too. On some indicators, Europe's frontrunners are ahead of the USA. The Dutch, for instance, are far more likely to eWork from home than Americans, and the Finns are far more likely to do their banking online. There are significant variations across the EU Member States. The information society is arriving more slowly in the Southern and Mediterranean states, particularly in Greece and Portugal. Spain, Italy and France are also lagging behind their European neighbours in many respects. On the other hand, the Scandinavian countries are amongst the most advanced nations in the world. In terms of 'eReadiness' – the extent to which a country's business environment is ready for Internet-based commercial opportunities – the Economist Intelligence Unit ranks Denmark, Sweden, Norway, Finland (and the UK) ahead of the USA. The strong showing of Northern Europe is a result of recent investment in high speed fixed infrastructure, where many parts of Europe are far behind the USA.

Bill Gates vision – or Europe's?
Another way of looking at this is to think of this vision of the Information Society as one determined by the USA, or more specifically, it's a vision born out of Microsoft and Silicon Valley, largely static vision with 'a PC on every desk'. One area where Europe has been ahead of the USA is in mobile communications. When it comes to the take-up of mobile phones, the USA trails behind every EU-15 member state except France as well as many of the new accession countries.

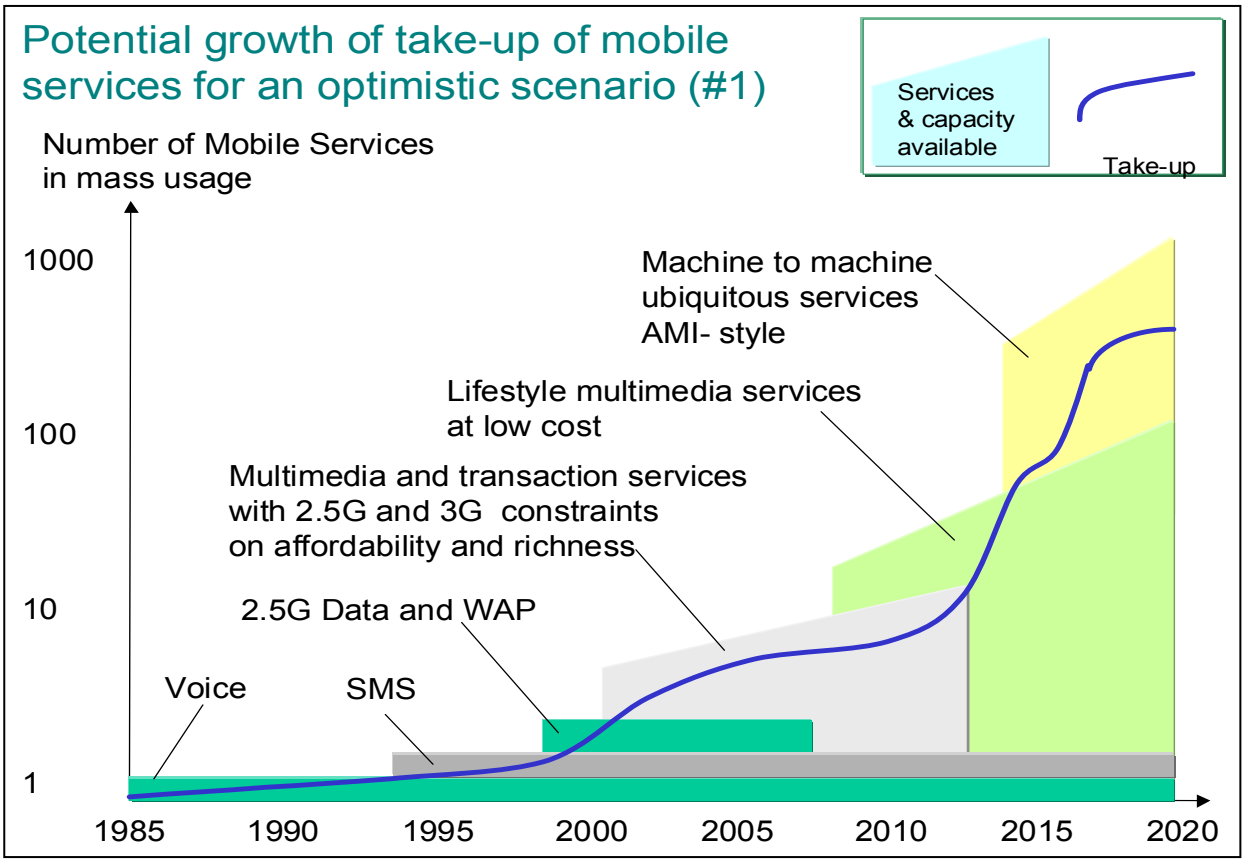
If the future is mobile, then Europe has many advantages over North America. To be sure, the development of 3rd generation mobile systems has been slow in Europe so far and the

technology is unproven and market demand of services is uncertain. Only a tiny proportion of global mobile subscribers are 3G and the vast majority of them are in Japan and South Korea.

Europe in a global, wireless vision of the future

But this is extremely significant. For if the future information society is going to be based around notions of any service, any time anywhere, then it is not to North America that Europe should look for comparison or inspiration but to Asia, to Japan, South Korea and China. These countries are already looking far beyond 3rd Generation mobile systems to a so-called 4th generation. What exactly that means is still unclear but essentially it means adopting a different network architecture to the cellular concept first developed by Motorola that has driven wireless communications for the past 40 years. Future systems will be based on 'mesh networks' so that users in the network become part of the network infrastructure itself. This means that potentially the infrastructure becomes much cheaper to build thereby driving down the cost of new services and making their mass take-up possible for the first time.

There is a sense that because Europe has invested heavily in 3rd generation technology and because operators in some countries (notably Germany and the UK) paid very high prices for licences, that Europe should hold back development of future technologies so that it can reap the rewards of this investment. Asian countries, however, see that there may be an opportunity for them to leapfrog Europe's lead, established through GSM, by investing in 4th generation technologies. If prices can be driven down, then the potential global market for mobile communications is not at its current level of about 1 billion but more like 5 billion – with significant populations in China, India and elsewhere in Asia and South America becoming part of this vision of the information society.



Broadband Wireless in Korea: Lessons and Implications

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based on the on-going IPTS study "Mapping European Wireless Trends and Drivers"

This paper summarises for policy-makers certain key lessons that we may draw from the Republic of Korea's experience and how Korea stimulated rapid economic development based on ICTs. This study identifies the lessons to be learned by others from Korea's transition towards a knowledge based society. Studying the Korean model can give insights into how alternative wireless technologies (AWTs) and their services are likely to evolve globally. Some elements of the Korean experience can be replicated but others are specific to Korea.

- Korea has made major strides in information and communication technologies over the past three decades. From being a country with almost no ICT access 30-40 years ago, Korea has become one of the top three globally in access to ICT based services. A basic ingredient of Korean life is now the availability of communication, information and entertainment from anywhere, at anytime and from any form of terminal, most usually a mobile handset. Today 16% of Korea's GDP and 30% of exports comes from the ICT sector[1].
- AWTs figure heavily in this with some 18,000 commercial WiFi hotspots available nationally by 2004 and new wireless broadband being made available this year, 2005, from new initiatives and licences for a 1Mbps wireless service nationally, WiBro. Industrial AWT networks such as Zigbee for RFID and industrial sensors are also being piloted in Korea, while most terminal and handset devices designed and manufactured in Korea have short range AWTs embedded such as Bluetooth and RFID. For instance, SK Telecom's Moneta service has more than 470,000 point of sale terminals that accept payments via RFID chips embedded in mobile handset.
- In particular, Internet usage in South Korea has seen higher growth rates than most countries. Internet usage has increased from approximately 140,000 subscribers in 1994 to around 30 million by the end of 2003, indicating a startling 65% penetration rate.
- South Korea is most known for its remarkable uptake in ***broadband*** Internet access, with broadband penetration rates accounting for almost 25%of Internet access [ibid].
- Broadband connections are ***highly used*** – for instance to listen to CD-quality audio over the web. Often a large directory of streaming MP3 sites, Shoutcast.com, lists Mulkulcast.com (a Korean radio station) as the most accessed MP3 streaming site in the world. Moreover, the streams are all in Korean, and therefore restricted to the relatively small global population of Korean speakers, streaming only Korean pop music.
- A major step forward in ***technology and equipment*** has resulted from this lead in broadband wireless – for instance self-adaptive terminals can automatically recognize which network is being accessed and not just which one has the strongest signal but which

[1] Financial Times, 22 April 2005, Anna Fifield, Busan looks to a ubiquitous future.

of those available is the cheapest or fastest according to pre-set customer preferences (e.g. handsets such as KT's "One-Phone" or "Nespot Swing").

- Korea is now bringing together the two technologies in mobile Internet access, with development of the ***"Portable Internet"*** using a home-grown AWT, WiBro, as its carrier infrastructure. Thus AWTs act at the enabling intersection of these two technologies. Mobile subscribers with a multi-mode handset can the browse the Internet, at broadband data rates, download and stream audio and video, and hold interactive video dialogues. Perhaps also most significant are the major export opportunities of bringing Internet connectivity to the developing world in the same way that mobile networks have brought voice connections to the least developed parts of the world. Thus policy-makers, especially in developing economies, could usefully examine its evolution to introduce broadband data to their mobile phone population.
- One of the major influencing factors driving the high rate of ***mobile usage*** in South Korea is, and has been over the last three decades, the government's strong involvement in the country's development of next generation core technologies, which includes both wired and wireless communication.
- ***Government intervention and orchestration*** of the private sector is a (*perhaps the*) key factor. Government encouragement of broadband, since the early 1990's through independent operators and the national incumbent has set the pace for national renewal of the telecommunications infrastructure. Access for broadband was initially via a fixed infrastructure, with fibre optics, but more recently has turned to wireless. Thus wireless should be seen as one technology in the context of a broadband policy which also employs fibre installation, and DSL cabling of all types to the home and office. The future is also planned with new programmes stretching to 2010 and beyond. The latest is IT 839 where AWTs are a key part of its strategic financial target for GDP of US$20,000 per capita. The new WiBro AWT network project is expected to attract eight million users, bringing $2.68 billion in sales and 40,000 new jobs by 2010. This is part of the general transition under way, from early post-war growth based on cheap labour to undersell the Japanese in the world markets for manufactured goods, to compete on innovation and quality with a sophisticated highly educated workforce and a larger service economy.
- The Korean ***regulatory regime*** has cleverly used its revenues from spectrum licences and taxes on operators as a ***strategic re-investment fund*** for telecommunications infrastructure and research. According to the ITU, such investments have produced phenomenal results in Korea, for instance, establishing its position as the world's broadband leader. It is an example of how prudent use of spectrum fees and the right regulation in terms of operator taxes on revenues can help boost the overall economy, through connectivity across society, to the benefit of the nation, and to the industry, rather than just being as a tax on it.
- A further factor is Korea regulatory system's creation of a fairly level playing field in ***telecommunications competition***, with an excellent example of how to ensure free competition without dominance by the incumbent operator. Its broadband position, which leads the world, is driven by competition between broadband providers. The mobile market also exhibits vibrant market competition, with three highly developed networks (SK Telecom, KTF and LG Telecom) while Hanaro also offers competition from its AWT position in broadband wireless with a new broadband internet access will compete with Wibro with (competing) operators Hanaro and KT.
- It is also useful for policy-makers to understand that Korean government policy has led to an increasingly ***converged broadband network environment*** termed the BCN, Broadband

Converged Network. Such a broadband converged network may be seen as a model for similar networks around the world in architecture and policy to bring it into being. The policies Korea are currently developing focus on specific strategic industry moves and key technologies, 'picking winners'. These include the creation of mandated mobile exchanges, to integrate mobile operator's access to internet services on behalf of the users, also implementation of protocols like IPv6 and naming and addressing ENUM (for mapping a PSTN telephone number into a typical Internet Uniform Resource Locator (URL), that is, an e-number). Note that this is necessary as Korea's mobile and broadband networks, while advanced, have evolved separately; they differ in their composition, network architecture, and business models. Here, the key point is that ***the government has pushed integration*** where single operators or equipment suppliers would have floundered in their different corporate strategies, especially as there is no blueprint or precise picture of the future network, only a dynamic model to capture merging of two architectures and communication sectors - Internet and telecoms.

An agenda for sustainable growth in Europe

Carlos Buhigas-Schubert and Hans Martens (Chief Executive, European Policy Centre)

The Lisbon Process has been declared dead by many and too often is seen as a symbol of the ailing, 'old Europe' unable to meet the challenges of global competition. As this paper has shown, the EPC Task Force has taken a different view. Not only is the Lisbon Strategy as relevant now as it was in 2000, but this report also highlights a number of areas in which Europe has achieved impressive global competitiveness. Europe is home to nearly half a billion people with high-income levels and strong social welfare programmes and yet Europe remains a strong magnet for investment. The truth is that Europe has strong economic and social foundations which should be built on - not weakened or destroyed.

The Task Force acknowledges the areas in which Member States have failed to deliver on the Lisbon goals in different parts of Europe as well as the continuing need for serious reforms. But the fact remains: some parts of Europe actually deliver world class competitiveness, while others have fallen behind. The Nordic model seems – more so than most – to be able to deliver economic growth, relatively low unemployment, decent social standards and a commitment to both environmental sustainability and fiscal stability simultaneously. The 'Lisbon success stories' include those who have managed to keep state intervention minimal in the development of product, service and labour markets. Larger continental European countries are still struggling to reform these markets. Moreover, a number of Southern and Eastern European countries are laggards in creating sustainable economic growth – not so much in terms of immediate economic growth prospects but in terms of the structural modernisation of their economies which is essential if they are to stay competitive over the longer term.

The EPC Task Force has taken a view of competitiveness that is broader than the narrow economic growth criteria emphasised by others. Given global competition and the rapidly changing world economic environment, Europe's only chance of staying competitive will be to invest substantially more in knowledge-based industries and services. Competing on the level of narrow production or labour costs is not a sustainable way forward for Europe. Inevitably we will lose jobs in sectors that are dominated by price competition. As has been shown above, this is why the development of knowledge-based economies are crucial for Europe's future – as also strongly emphasised in the Lisbon Strategy. But this only underlines the serious concern we share that our economies are simply not investing enough in expanding the knowledge base. This increased focus on the importance of knowledge-based industries does not imply that Europe should give up its industrial base. On the contrary, it means that the industrial base needs to be subject to constant modernization, through the integration of research, development and new technologies existing industries.

Only through the creation of a long term potential for growth can Europe sustain its economic and social model. The great majority of European citizens want to uphold the benefits of this model. The most compelling reason for creating improved economic growth is not just to participate in an international race for the highest short term growth rates. Rather it is to lay the basis for sustainable growth. This is why the Lisbon Process must continue to embrace both social cohesion and environmental sustainability.

These may be viewed as factors that add costs to the economy. But they also promise great advantages, including a largely untapped entrepreneurial opportunity to sell Europe's social and environmental expertise, products and services in a rapidly industrialising world market.

The Task Force has identified two areas where reforms in Europe are urgently needed: labour markets and welfare systems on the one hand, and the development of a more innovative and entrepreneurial Europe on the other.

Rigidities in the European labour market do create problems. In our rapidly changing economies nobody can expect skills and jobs to remain frozen in aspic for decades. We must all be expected to constantly upgrade our skills in order to adapt to changes in working world. Greater investment in human resources is consequentially a key recommendation of this report. A good education and a willingness to constantly upgrade one's skills is thus the best (eventually the only) way to remain employable. This implies a qualitatively higher degree of flexibility in the labour market as a whole.

Welfare systems also need to be adapted to the changing economic environment. They should not be designed to guarantee the protection of those that have jobs if this is to the detriment of those that are unemployed or seeking work. Secondly, budgets for social and labour market support should be directed towards Active Labour Market Policies to address the structural deficiencies in unemployment policies. Resources should be devoted to helping people back into work rather than funding long term unemployment.

The demand for knowledge-based growth also points to another European weakness: the unfortunate tendency fall behind the global competition in terms of innovation and entrepreneurship. With the rapidly changing environment, life cycles for products and services are becoming shorter and shorter. Thus, even the largest companies are forced to constantly reinvent themselves to stay at the cutting-edge of competition. This requires a high degree of innovative behaviour, which can only be achieved if the regulatory and market environment is favourable. Europe has a range of sectors in which it has established itself as a global leader. These sectors need further development. At the same time, market access should be improved by a series of efforts to implement and update the EU's internal market. This would also allow European companies to collaborate and operate increasingly across European borders, and follow the successful examples in the creation of economies of scale within Europe.

The Lisbon Agenda's target of reaching a quantitative level of 3% of GDP is relevant, but it is also important to ensure that the funds for research and development are spent in a forward-looking manner. Aside from merely reaching the quantitative target, qualitative concerns remain. Europe must develop its scientific and research base to avoid a 'brain drain' to other parts of the world. Thus, the best brains need to be given the opportunities and challenges that will tempt them into staying in Europe. This requires an improved relationship between research facilities and universities and the markets.

Small and medium sized businesses are key for employment creation and for the development of innovation. There has been much focus on the costs and duration of starting a new business, this report has highlighted a crucial additional point, namely the how to overcome the existing obstacles for the development and growth of small businesses so that they might become the winners of tomorrow. Europe, in this regard, suffers from a lack of entrepreneurial culture, often unnecessary 'red tape,' a lack of risk capital and proper market

conditions for SMEs to prosper. Public support can help, but this type of investment cannot be the main driver for company growth. Europe has many examples of excellent practices. The focus on regional strengths and the development of entrepreneurship in partnerships between SMEs, research institutions and public authorities can be cited in this context. Many of these 'best practices' could be transferred from one area to the next, and a maximum effort should be made – across Europe – toward facilitating this process.

In conclusion, Europe needs better growth performance. It needs growth to stem those pressures threatening the European model, which derive both from global competition and the demographic changes of ageing affecting Europe. We already have many examples of good practice in Europe, and it is crucial to start learning from these best practices and get down to implementation of these reforms. Only by doing so can we ensure that Europe will be a region of economic growth and opportunity with an innovative knowledge-base, a high degree of social cohesion and a sustainable environment for the next generation. Surely such a cause merits the direct support and involvement not only of European institutions and national governments, the European and national Parliaments but also of regional authorities and organisations representing businesses, trade unions and civil society at large.

Thinking Organizations: the New Milestone in Corporate Behaviour – Can IT Support it?

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Abstract:
The process of establishing the inner »self« has reached the organizations. They are more and more positioning themselves as a live being. Creative thinking and value innovation is the road to success. The winning business stories are based on core competences and values that could be reflected in processes, models, customer segmentations, supply chain management, business relationships, etc. IT should respond to the call for individuality, self determination, innovation and constant transformation. IT should drop the role of creator and accept the natural role of a supporter. Can IT do it? Can it do it fast enough?

The corporate world is dramatically changing its behavior. The era when the outside players (competitors, customers, substitutes, new entrants) were defining who and what the organizations had been, are almost over. Now the inner qualities lead the way of market definition, business development and success. They are based on the core competences (collective mind) and values that are the foundation of differentiations, positioning, innovative thinking and operations of every business ecosystem.

The innovations (in products, services, solutions, processes, models, relationships) are acknowledged as a sole »value adding« creator. In the global world, with a surplus of financial means, the creative idea is the one that feeds the success.

For the last 5 years I have been intensively working with companies on sustainable growth. In order to reach either their higher value or/and profits, we based our innovative strategies on management, deployment and development of business relationships in tune with corporate core competences and values. We developed the approach MABS® that is based on the nucleuses, driven by positive and clear energy, which had been the drivers of the change and development. Experiences had moved us towards the concept of »organization as a life being«.

We realized that every organization is a being on its own, with unique dreams, history, emotions, qualities, limitations, future, character, talents and behavior. Each has its own way of defining the rules, the boundaries, the visions, core goals, strategies, and processes.

Regardless of the industry, size, and market power we discovered that each of them covered a similar set of business elements, but the path for their utilization was quite different and unique for each of them. We have learnt that the way to reach the success is not by means of products or services, but with the ways of doing or making them.

Later on, the field work made us realized that even processes are not really the source but rather a consequence of an internal »self«. Every subject and object is calling for an acknowledgement and clear positioning in the relationship with others. So, in order to respond to this new conciseness, we moved one level higher in business interaction and started working on the relationships level.

We set a framework of 9 basic business relationships: employees (including management) to vision and mission of the company, employees to employees, management to employees, management to owners/shareholders, management and employees to public, to suppliers, to customers, to environment, and the core one, relationship of every individual with her/him self.

Such an approach allows creativity processes to be filled with emotions and differentiation. It also fully recognizes a human being as the primary driver for business success.

Therefore, can a business organization afford not to have on every position in the company people that think, create, enhance, and improve? For employees and managers, it is no longer enough to just work and learn; they have to think and innovate constantly, be creative, and profitable, of course. Looking at the issue from a broader time perspective, we can say, that in the past, we had working organizations, later the emphasis moved to learning, and today, it is on thinking. Most probably, tomorrow will simply be on »being«.

Due to the changes in the perception of the core elements of successful business, the question is raised: What kind of information technology can support such an organizational behavior?

What is the future role of IT systems? The historical reasons (concentration of knowledge, learning curve, etc) allowed computer industry to become, not only an excellent supporter of business processes, models, but also a creator of the corporate life style.

Therefore, the IT became more and more standardized and allowed less and less creativity, even on the application level. Standardization of IT is a great move for IT manufacturers, however, a bad news for customers. I believe that neither the processes nor relationships should be defined by the IT itself. Businesses should have enough freedom to use processes and relationships as a field of opportunities for their market competitiveness.

In order for IT suppliers to really respond to customer needs they need to step down and accept the honorable role of the major supporter who understands uniqueness of each company (processes, relationships, visions and core strategies). The IT should be able to allow the innovations to flourish on all levels.

Can IT suppliers and developers build reliable pillars instead of trying to define what and how should it be used for? Is the industry in EU creative and opened enough to make the necessary steps? Can we overcome the ERP models that try to make the world alike? Can we make IT a supporter of our natural way of co-existence?

IST and organisational innovation – Changing skills and educational redesign.

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Issue: while in a vast majority of countries, the supply of tertiary-educated labour force is inevitably due to decline (see note[2] 1), sustained growth resting on IST will be increasingly requiring new forms of competence building and organisational flexibility. While in the past, for a significant majority of jobs, scholar credentials were sufficient to ensure the fit between skills and jobs that were both easier to assess, the nature of IST imposes renewed analysis of all aspects related to qualification. The argument should be related not to the conditions of technological innovation but to the conditions of technology propagation, being a necessary condition to IST deployment.

A. The lacking Degrees

Both in the US and Europe, the projections combining demographic changes and educational attainments show with no doubt that the model where the young incoming tertiary-educated labour force is assigned to ensure the main contributions to the growth of productivity and efficiency is on the brink of loosing a significant part of its relevance. There is no question that that supply of tertiary-educated young people will drop, in the course of the coming decade, well below its current level. While the annual growth of employment of the tertiary-educated workforce lied at close to 3% in the past decade (1996-2003) for the EU15 as a whole (twice the level of the average employment growth), projections show that for the 2010-2020 decade that growth could not possibly exceed a 1% figure (note 1). Therefore, sustained growth will be in increasing need of organisational innovation in order to base overall growth, and productivity growth in first instance, on other forms of competence building, and more specifically of lifelong development of competences.

A wide set of side aspects confirm that the practices that were coherent with - or only convenient in the frame of – an open labour market and demographic abundance, e.g. overqualified hiring, will have to give way when facing the emerging closed labour market. The extent to which the ageing workers still are evacuated out of the workforce appears to have been similarly consistent with the old demographic and technological pattern.

B. The area of relevance of front-end scholar credentials

The historical legacy that goes on determining the major part of the educational system and its deliverables also leads to an increasing number of inadequacies. The (soon to decline) abundant young labour supply led indeed, both within the educational system and within the labour market itself, to the progressive consolidation of selection strategies that were often equivalent to a "skimming the cream" process. The past technological paradigm was re-enforcing this by privileging "dedicated knowledge" and "dedicated know-how".

Even if the demographic bottleneck was left aside, the very nature of IST – either on the "technological innovation" side or on the side of their propagation as rationalisation tools to

[2] The quantitative analysis that leads to the present questioning of more qualitative issues was developed by the author in his Atlas of Prospective Labour Supply, Geolabour, 2005, Dublin. Or in The demography / growth squeeze in a Knowledge- based Economy: the role of education, IPTS, ICT Unit, 2005, available at... fiste.jrc.es/download/ Demography%20-%20Growth%20Squeeze%20-%20Coomans%202004%20Final%20Draft.pdf

the widest range of activities – reconfigures the balance between on one hand the "dedicated knowledge" and "dedicated know how" that was delivered by the educational systems and on the other the "open skills" or (or "reactive skills" or "flexible skills"), e.g. interactive skills, problem-solving capacity, learning ability. IST are indeed requiring more and more these "open skills", where experience and on-site learning progressively prevail upon front-end scholar attainments. This is illustrated by the "crisis of credentials" in hiring strategies and by the joint development of "job assessment" and "skill assessment". These changes, driven by the technological instability that is part of the IST, also question all certification practices that remained unquestioned in the frame of past technologies.

C. The "early watch" of the new forms of competence building that are emerging and the analysis of their systemic implications deserve a closer attention. The new trends in human resource management often reveal the extent of the pressure. Trends like these that involve "employee retention", "age management", "talent hunting" or "talent strategies", "peer assist programs" or "mentoring circles" unveil many new features, no less than the re-evaluation of the rules of interactive work organisation (e.g. "trust and respect – rather than command and control"[3]. The progressive "internalisation" within the enterprises of the re-skilling of the workforce, the changing content of the what is being defined as the required KBS-compatible "skill's set", the spreading around of the "freeters" – those young zapping employees – represent changes that heavily impact the productivity growth or the balance between leaders and SMEs.

These changes, where the effect of the demographic changes intertwined with organisational innovation, are a central part of what determines the propagation of IST and its contribution to growth.

[3] See Deloitte Research Study, It's 2008: Do You Know Where Your Talent Is? Why acquisition and retention strategies don't work, 2004, Deloitte Development LLC.

IST at the service of an Ageing Europe

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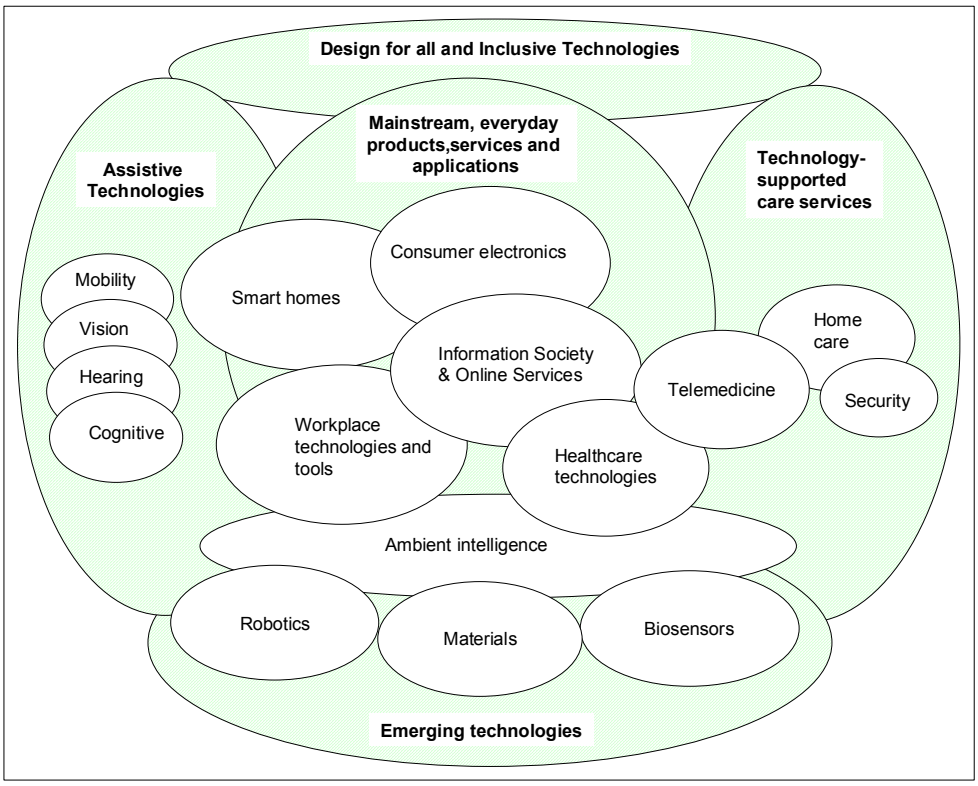
One of the most fundamental challenges facing Europe today is the rapid ageing of the population. The effects will be registered in a wide spectrum of social and economic areas, including the labour market, the consumer market, lifestyles and the need for health and social care. IST developments will intersect with these developments in many ways. Ageing policies need to understand and anticipate the implications of IST developments and IST policy needs to give attention to the shaping of technological developments in ways that meet the needs of an ageing society.

The evolution of IST technologies and their applications

As indicated in the schema below, there are many different IST technologies, applications and services that have relevance for older people.

Key ISTs for an ageing Europe



To begin with there are a myriad of mainstream, everyday products, services and applications that are of just as much relevance for older people as they are for other age groups and in some cases can be even more relevant. Information society services and content can open up many new opportunities for participation for people who have restricted mobility, for example. Smart home and consumer electronic developments can make management of the home and everyday living a lot easier for older people. Workplace technologies and tools can

help to prolong working life. Healthcare technologies can help in prevention, early detection and cure, as well as in facilitating management of chronic conditions.

Because older people are at an increased risk of having functional difficulties in areas such as mobility, vision, hearing and in some aspects of cognitive performance, specifically designed ICT-based assistive technologies can also be of great benefit. As well as assistive technologies, many of the challenges of old age require support from the health and social care services. Telemedicine opens up new opportunities for providing medical care to the home and there are many new developments in the field ICT-based home care, including ways of monitoring wellbeing and providing a secure home environment.

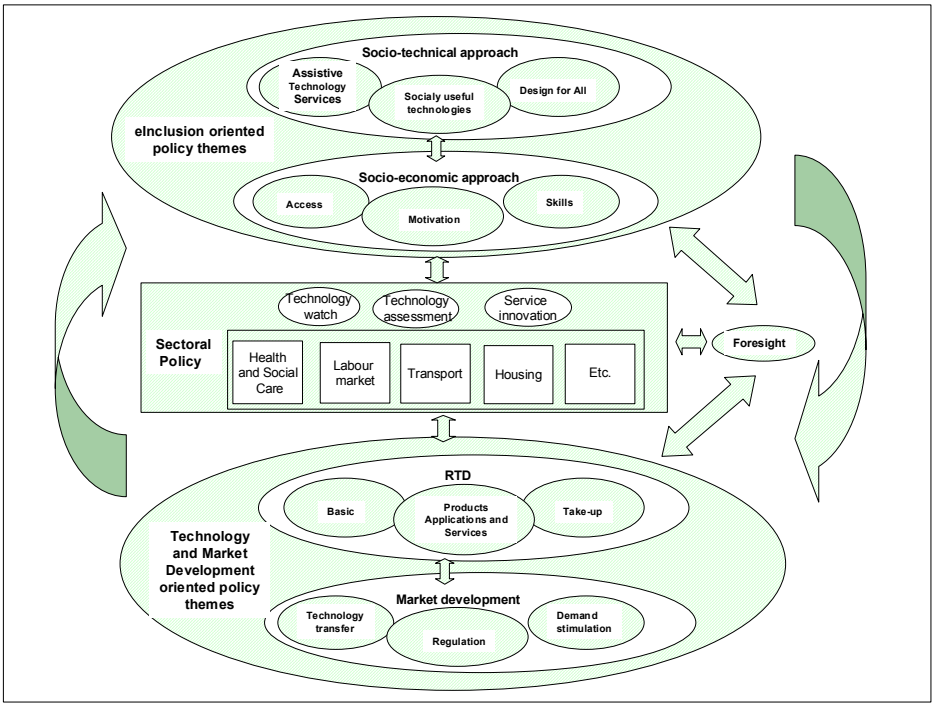
Underpinning future developments in many of these areas are some key emerging technologies. These include robotics, new materials and biosensors. In addition, the emerging concept of ambient intelligence offers great potential, with the possibility for the whole environment (at home, on the move, in the street, whilst driving or during transportation, in public buildings and so on) to have embedded intelligence that helps with everyday life.

Finally, as well as the many opportunities there are also some potential barriers posed by technological development if these are not foreseen and addressed in their design and deployment. In particular, the design and development of mainstream technologies needs to be based on design for all principles in order for them to be usable by older people with functional changes and decline. In addition, technologies need to be designed and deployed in ways that ensure that they are inclusive and do not lead to new forms of exclusion through social isolation or other processes.

Shaping IST developments to meet the needs of an ageing Europe

A coherent and integrated approach across a variety of different policy lines over the next 15 years will be needed in order to help shape IST developments in these fields to meet the new needs of the ageing population. Some of the key policy dimensions and their inter-linkages are indicated in the schema below.

Policy to shape IST developments to meet the needs of an ageing Europe



At the core are the main sectoral domains where the technologies will ultimately be applied and the benefits will be gained, such as health and social care, labour market, transport and housing. Policy in these areas needs to be aware of relevant technological developments and incorporate these into their strategies and measures. Important technology-related activities at the sectoral level include technology watch, technology assessment and, especially, service innovation where technologies are utilised in the development and enhancement of public services.

Feeding into the sectoral policies are the results of two conceptually separable yet inter-related policy themes.

The first theme encompasses eInclusion oriented policies that give a dedicated focus to ensuring, on the one hand, that the opportunities presented by technological developments will be for the benefit of older people and, on the other hand, that older people are not at risk of negative consequences as a result of technological developments. Within this eInclusion policy theme, both policies focusing on socio-technical issues (such as identification of socially useful technologies, design for all and assistive technologies) and those focusing on socio-economic issues (such as ensuring access in terms of availability and affordability, encouraging motivation to use technology and developing the skills that are needed) are important.

The second theme encompasses policies relating to wider technology and market development issues. On the technological RTD side there is a need to ensure that basic research in fields of particular relevance for older people are pursued, that applied research addressing product innovation and development gives a central consideration to the opportunities presented by the ageing market, and that demonstration and other activities focusing on take-up give a high visibility to the potential offered by products targeted towards the needs of older people. On the market development side, there is a need to support

technology transfer from research to industry and across industry sectors, to ensure than an appropriate regulatory environment is in place and to introduce measures to stimulate demand.

Technology transfer is especially important between RTD focusing on the needs of older people and mainstream RTD in the consumer product and related fields. An example here is the case of smart homes, where there are many application concepts for older people emerging from dedicated RTD in this field, but these have yet to be taken up in the mainstream, mass market smart (or networked) home field because of deficiencies in technology transfer processes.

Regulation also has an important role to play in market development. Perhaps the clearest example of this is in the area of universal service in telecommunications, where efforts have been made to balance the requirements of a competitive marketplace with social concerns, such as ensuring access and affordability for older people. Likewise, there has been a growing development of regulatory approaches in relation to accessibility of mainstream products and services that has a central significance for older people, for example, in the standards field and in public procurement.

Public policy also has a role to play in relation to demand stimulation. Examples would include awareness raising and encouragement of technology-based service innovation in sectoral domains like health and social care and housing. In the case of the latter, it is relevant to note that demand for technologies that meet the needs of older people is not limited just to individual older people themselves. In fact, in many cases public sector intermediaries play a major role, for example in the purchase of technologies for health and social care purposes, or in the incorporation of smart technologies into public housing.

Finally, and crucially, it is essential that policy be informed by foresight. This includes both demographic projections and social and technological watch and forecasting. Demographic forecasting is needed on issues such as changing dependency ratios, the ageing of the workforce, disability, ill-health and need for care, including identification of key cohort effects of relevance for policy in the technology and ageing field. There is also a need for social foresight, including projection of trends in relation to living arrangements, orientations towards work in later life and lifestyle and consumption patterns. Finally, there is a need for technology foresight, including projecting the speed of deployment of already available technologies and anticipating new developments and paradigm shifts

Some Thoughts on Future IST from a Designer's Perspective

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Ubiquitous Computing, Pervasive Computing, Ambient Intelligences… – many different labels exist describing more or less a similar concept from different perspectives: the deep integration of information and communication technologies (ICT) into our surroundings, our environments, our daily-lives. By that means the upcoming ubiquitous and networked ICT have a major impact on the prospective development of the societies, not only in the economic but also in the socio-cultural realm.

In this brief position paper I will treat the conceptual framework of "Ubiquitous computing" as a synonym for the future of Information Society Technologies (IST) since it combines and integrates all major issues of computing and digital technologies and thus addresses the total of IST's possible complexity. The current development of omnipresent chips, networks and sensors and their integration appears to be mainly technology- and marketing-driven. The example of the UMTS licenses in Germany exemplifies the limits of this basically task-oriented approach: if technology is an end in itself, customer acceptance and success on the market are doubtable and only very limited values for the society will occur. From a designers' stance I would like to bring the original idea of Ubiquitous Computing to mind and strongly advocate to continue developing this direction: Ubiquitous Computing ought to be considered as a cultural technology just as writing. As something that vanishes in the background of perception and that does not require permanent attention. As something that appears when needed and disappears again [Weiser 1991]. As a "calm technology" [Weiser & Seely Brown 1996] or even better a non-technology [Norman 1999]. As something that enriches our daily lives and supports us in our needs. By that means, Ubiquitous Computing has more of a social vision than of a mere technological one – it seeks to integrate seamlessly the digital realm into everyday lives and not to integrate us into the technologies, as so many approaches such as Virtual Reality (VR) conceptualize.

We can identify without any doubt countless technological challenges of Ubiquitous Computing: standardization, identification, interoperability, protocols and data exchange etc. Beyond we can also think of social and political aspects of these technologies such as security and right for informational self-determination. We can furthermore think of market potentials, of products and of services that support people in their lifestyles. But one crucial issue of Ubiquitous Computing with a fundamental impact on the agenda for developing IST is underrated: it is the aspect of its invisibility. Computers become invisible, functionally-technically as well as cognitively-emotionally (a subject that already was addressed by FP Five's "Disappearing Computer" programme). Being embedded in our everyday life – in objects as well as in environments – the invisible and imperceptible ICT can augment literally every single physical object with digital abilities. The question is, how we can recognize the nature of an artifact: what is it, what does it provide, what is it good for? And: who is his master's voice? The normal citizen's ability to recognize, read and decipher these so called "smart" artifacts will be crucial to cope with these technologies and by that for their acceptance. Even worse: since these technologies might be everywhere and since they are invisible, each artifact potentially could be digitally augmented. By that means all personally

unknown objects will be generally suspicious, especially as negative experiences due to immature or deceitful products and services on the market won't be avoided. Thus, this is not only a discussion about the semiotic qualities of Ubiquitous Computing and describes a novel claim for the profession of design and its expertise. Certainly electronic functionality augmenting physical-world objects must be designed to communicate its nature and its functions. But beyond designing the fusion of digital and physical worlds, it is also a discussion about moral and separating the wishful from the possible. Trustworthiness will be a crucial factor while establishing these next Information Society Technologies.

Conclusion

If we agree on the prior observations and conclusions, one has to initiate new core areas for IST research. As one task for a political agenda it is required to strengthen transdisciplinary educational programmes that focus on the fusion of digital and physical design. It is a matter of university curricula and programmes to enable experiment and experience as well as to analyze and forecast and by that to create knowledge and to form a specific body of knowledge in this domain, integrating expertise from technology, social sciences and design. A second conclusion considers the insufficient integration of user-centered disciplines, such as design, media arts and architecture into the landscape of IST research. Either we need new and alternative programmes to the existing ones, that focus on developing demonstrators and showcases and seek to encourage the participation of the design disciplines or the Commission ought to shift the core focus of current initiatives and to address a novel and less technological centered direction of research.

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About the Author

Jochen Denzinger, born in 1969, lives in Frankfurt/Main and works in the domain of interaction and interface design. After his graduation in Industrial Design he has worked for several design studios as well as in the area of applied sciences. Among the research institutes he worked for is the Integrated Publication and Information Systems Institute (IPSI), where he worked in the field of Computer Supported Cooperative Work (CSCW) and Augmented Reality. At the Hochschule fuer Gestaltung Offenbach, he researched on science communication. Since 2002 he has been working for the MARS-Exploratory Media Lab of the Fraunhofer-Institute for Media Communication, cooperating in the development of innovative user interfaces and tools for explorative knowledge discovery. Beyond his researching activities JD has been teaching at the University of Applied Sciences in Kaiserslautern since summer 2004. There he shares his chair in the "Virtual Design" program with his colleague Stefan Karp. Jochen Denzinger's work strongly focuses on the question of how Ubiquitous Computing, the omnipresence of computers, affects our everyday life. He understands ubicomp as a new paradigm for interface design and is particularly interested in the question on how to create digital technologies that are more intuitive, more friendly and hence more human-centred.

Information Society Technology Policy Options and Strategies for Changing Europe by 2020: Lessons from Asia

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Introduction

The present paper is an attempt to analyze the experiences in implementing information society technology (IST) policies and strategies around the world and seeks to identify whether there are any lessons from some of the Asian countries that might be relevant for evolving a perspective for changing Europe by 2020. An optimistic scenario of 'information society for all by 2020' is likely to be determined not only by several socioeconomic factors but also by the character of 'globalization' and nature of the information and communication technologies (ICT). Moreover, a trend of multiplying convergence of different technologies is also emerging. The convergence of different technologies like information, biological, materials, and nanotechnologies is likely to have revolutionary impact.

European Union IST Policy options

In March 2000, the European Union set out with a strategy "*to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*." However, the mid-term review of this strategy in 2004 revealed that the results were disappointing in the context of the specific targets set up by the European Union. Some of these are reaching the Lisbon target of a 70% employment rate and those based on the comparison with the US benchmark. On the basis of this, three particular areas were found requiring more attention. These areas are: improving the environment for innovation and R&D, developing a stronger information society and creating an enterprise environment that is more conducive for private sector economic activity. This raises questions as to whether the problems of existing digital divide will be ameliorated or exacerbated by providing greater attention to ICT or whether ICT based innovations will provide the answers over the R&D based innovations in terms of growth, productivity and sustainable development. Other theoretical issues that require answers are whether these target area are competing with each other and that as some studies have revealed, the 'resource movement effects' of the ICT growth will arrest the R&D based innovations or slow down growth in other sectors? It is also being argued by some that the very inherent characteristics of these new technologies will have leapfrogging effect that will bridge the digital divide. Except some of the Nordic countries, most of the European countries do not figure very high on the networked readiness index rankings and some of the Southern, Central and East European countries rank very low.

If the expenditures on R&D and ICT as percentage of GDP are any indications, amongst the European countries that have spent least on R&D (ranging from 0.7 to 1.4 %), are the countries that have spent several times more (2.2 to 9.5 %) on the ICT(Southern, Central and East European countries). Are these the options available or can these trends be allowed to continue if the targets of the Lisbon strategy for the year 2010 have to be attained.

Some suggest that in the US the rapid rate of ICT improvement is actually increasing the rate of growth of GDP or it is likely that ICT innovation is at least partially substituting for previous technological motors of growth (such as mechanization and electrification) to

keep productivity growth high. On the contrary, the findings of a recent study by IMF (2001) have reported that IT-using countries tend to benefit somewhat more than IT-producing countries. The disappointing welfare gains for IT producers are attributed to deterioration in the terms of trade. The study finds that while low net export earnings reduced the possibility of real appreciation, the IT-sector boom is likely to have had adverse effect on other economic sectors needing skilled labour, at least in the short run, because of the resource movement effect. Hence, skilled labour shortfall in general and as a consequence of IT boom is likely to be one of the important determinants for Europe to remain competitive by 2020.

A recent Delphi exercise conducted by the FISTERA has indicated that for most of the experts, *Education and learning* clearly outstand as the number one application area improving job creation within the Europe. In the category of R&D and Social needs, it was perceived widely that *establishing more user-friendly systems* and *enhancing security of transactions and personal information* are 'Top' challenges and areas in which R&D effort should be focused. The issue of *enabling trust and authentication of parties in IST-mediated activities* followed in terms of importance. However, enhancing protection of Intellectual Property Rights remained much lower priority for the experts. For socially beneficial actions, the preferences that scored high were *Social and institutional innovations* and *Reducing the "digital divide"*.

In the preceding context, are there any lessons from Asia that would be relevant to the European conditions and what are socioeconomic factors that influence ICT growth along with dynamic competitive environment?

Lessons from Asia

Asia accounts for more than 80 percent of the total world output of several IT products and Asia is equally dominant in its output share of critical components and materials used in the IT industry. Moreover, in terms of IT use, Internet penetration in South Korea, Hong Kong, Japan, exceeded even that of the U.S. level, with Singapore, Taiwan, not far behind. China represents one of the fastest growing markets, with the number of Internet users mushrooming from 22 million at the end of 2000 to over 60 million today. In contrast with the United States, most Internet use in Asia today is in the workplace, not the home. Asia's mobile phone use leads the world. China alone had over 200 million subscribers at the beginning of 2003, significantly more than any other country, including the United States. Although most of China's use is simple voice communication, Asia is also home to one of the most sophisticated mobile markets. In Japan, text messaging and other data services are popular. Taiwan and Hong Kong, each with over 80 percent mobile phone penetration, have among the highest use rates in the world. Across the Asian countries, extensive government assistance has played a significant role in fostering IT industries. That assistance has clearly been successful in establishing sizable IT manufacturing. These Asian countries have also maintained high economic growth. Out of these Asian countries, Hong Kong is a major IT user, Japan, S. Korea, Taiwan and Singapore are major IT users as well producers. China and India are new entrants in this category. Malaysia, Thailand and Philippines are major producers.

As far as e-government is concerned, Singapore, Hong Kong, and Taiwan rank among the most advanced e-government leaders in the world. Countries such as India and China have remarkable pockets of innovation in local government.

It also require to be noted that most of these countries are diverse in their situation of natural resources, demographic profile and also differ in their ranking of political and economic freedom index. Therefore, the level of correlation between ICT diffusion and these factors would also require closer look.

The Indian software production sector has increased 50-fold over the past ten years to $7.6 billion in 2002. India has emerged as one of the major offshoring destination. IT exports is expected to account for 62 of the IT industry in 2003. A recent finding made by the task force on human resource development in IT has reported a deficit of about 10,000 teachers in software training. This illustrates that despite a large pool of trained human resource, the less rewarding areas would remain less attractive and surplus human resource would encourage out-migration. These experiences are relevant for the upcoming offshoring destination like Czech Republic & Poland.

There were successful projects of utilizing ICT for disadvantaged communities. Text messaging through Mobile phones used by the hearing impaired and non-verbal persons is also an innovation that enhances social inclusiveness.

Concluding Observations

In the context of foregoing, it seems that to attain the goal of information society for all by 2020, Europe will have to strike balance between R&D and ICT based innovation. Efficient utilization of human resource will be a major challenge. For bridging the digital divide and social cohesion, a more decentralized, bottom-up and interactive approach will have to be adopted. Finally, the globalization process would demand Europe to brace up for competition as well as cooperation from the Asian countries.

Information Society Technology Perspectives -a technology assessment project in Hungary

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The *National Council of Hungary for Information and Communication Technology* (NHIT) is a high level board advising the government on ICT issues. In 2005 this body has initiated a project for a technology oriented study in order to help the different planning and strategy making activities, including the preparation of a National Development Plan for the 2007-2013 period. The project is titled "*Information Society Technology Perspectives* (IT3 according to the acronym of the Hungarian title). This study intends to survey the trends in the development and application of information and communication technologies, filtered according to the expected impact of these trends to the situation of the Hungarian information society in the target period.

The study is being performed in 12 main areas, eight of which are representing the core technologies (*basic circuits, communication, peripherals, architecture, application frameworks, content, system development, security*). They provide a **technology push**, which is confronted by the **utilization pull**, coming from three main areas: *business, public services, private sphere.* The twelfth main area deals with the all-embracing issues of *regulation*.

An overall survey of the development trends will be performed in the 12 main areas according to a uniform template including the following items:

- interpretation of the main area,
- list of important subtopics,
- main trends of technology evolution (with emphasis on disruptions),
- expected business consequences,
- expected societal impacts,
- specifics for Hungary,
- references to background documents
- references to news items

(the template in this form applies to the eight technological main areas, for the others a slightly modified template is used).

Apart from widely available data on the Internet, the main information sources will be the Gartner studies (http://www.gartner.com) and the FISTERA technology database (http://fistera.telecomitalialab.com).

After performing the analyzis of the main areas according to the templates described above, a number of **statements** will be selected, formulating meaningful assertions likely to have considerable effect on the Hungarian information society in the 2010s. These statements will be analyzed in more detail and justified with evidence from the literature. The statements will most likely be connected to the interrelations between the main areas, especially at the meeting points of the technology push and the utilization pull.

A few **examples** of candidates for the topics of such statements are:

- non-PCs as terminal equipment for wide Internet usage
- impact of unlimited bandwidth and storage to the business models of services
- development of ambient intelligence methods and applications

- collective methods of content development and their impacts
- wide use of robots and cognitive systems
- applications based on the Semantic Web
- use of virtual presence techniques in work and entertainment
- legal consequences of virtual worlds (working, living, playing)
- personal identification techniques (e.g. RFID), privacy issues
- "open source" phenomenon and its impact to software development and distribution
- swift from products to services and its impact to the labor market

The basic method in the first phase of the project will be **desk research**. Feedback to the (partial) results of the study will come from the members of the Council. In a later phase selected **panels of experts** will be involved and finally the results will be discussed with the general public of the Hungarian IT field.

The main deliverable of the project by the end of 2005 will be the technology assessment **study**, prepared and modified in consideration of the feedback received. Side-results will include a monthly **newsletter** ("Panorama") containing news items relevant from the point of view of the study, and the collection (**repository**) of background documents.

IST techno-economic paradigms

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(1) In my assessment, the Kondratiev-Schumpeter-Freeman-Perez paradigm (after what Brian Arthur has called the "Schumpeter-Perez-Freeman story) is the most persuasive large-scale innovation theory. Based on this theory, right now we are at resp. within the turning point of the 5th, ICT-governed, techno-economic paradigm, which began in 2000. The entire deployment period (20-30 years) of the ICT techno-economic paradigm is therefore still to come and a focus on ICT vital for a time perspective up to 2020 in any case.

(2) For any ICT policy, it is crucial to be aware of the specificities of the deployment period, viz. that financially, the time of venture capital is clearly over, and that what is needed for innovation policy is the attraction of 'smart money'. The 1990s will not come back, and the worst one can do is to use those designs for the decades to come.

(3) Related to this, it is the "inexhaustedness" of the ICT paradigm that, technologically speaking, makes continuation possible and necessary. For instance, cell-phones and their derivatives, as well as the PC as such and user surfaces clearly are in a very initial stage of conceptualization and user-friendliness. ICT policy – and related innovation policy – with a focus on technology needs to take precisely this into account.

(4) Within the KSFP theory, a key point is that there is a more general nature of the techno-economic paradigm. Each paradigm generates "a set of best practice principles which serves as a conscious or unconscious paradigm for steering institutional change and for designing the social tools with which to master the new techno-economic potential." (Perez) "When generally adopted, these principles become the common-sense basis for organizing any activity and for structuring any information." (Perez) However, this common sense is, in my opinion – and there I digress from, or would add to, the KSFP –, not dependent on paradigm, but rather on period. While the installation period is state-distant, business-driven, frenzy-esque, etc., the deployment period, with its focus on the "golden age" that it produces in the best of circumstances, is marked by organization, redistribution, state capacities, etc. In the current paradigm, the so-called New Public Management was necessary for installation, but it is completely inadequate for the coming deployment. This means that in all questions of ICT and governance (from corporate governance to organization to public administration and management reform), just like with finance (see (2) above), the worst design would be the attempt to replicate the successes (in the case of finance, as stated before) or even failures (in the case of management reform) of the 1990s.

(5) It is at the turning point, where we are right now, where the decision will be made whether the deployment period will be a Golden Age or a Gilded Age. If we follow Perez and look for socio-organizational readjustment, the latter seems right now more likely, because the readjustments geared towards the deployment period are happening right now, but only to a very modest degree – it seems that the lesson of

the crash has not been learned properly this time. While since about 2004, recognition on the level of scholarship has been quite good, policy has only very rarely followed.

(6) To make things worse, an exogenous key concern right now is that we cannot be sure how long the turning point will last (an end seems not in sight), and that we do not know whether a second crash – after the one in 2000 – might not be following, this time feasibly induced by the collapse either of the US economy due to its dependence on Chino-Japanese funding, and/or simply by the collapse of China. Industrial policy should at least start to get ready to draft contingency plans for such eventualities.

Security Stakes and Identity Management in the Future Europe

Alain Esterle

The development of Internet and the political push towards a society based on information and knowledge should remain a major trend in Europe and abroad. Beyond current and short term objectives such as Lisbon strategy and i2002 programme, a number of already visible evolutions should be achieved within 10 to 15 years, but with a good chance to worsen some complex issues of technical, social and even political nature.

One current orientation concerns the rapid migration of all information and communication technologies towards the digital process. On practicalities, the technical and operational benefit of digital voice, data, image, etc. is so big that analog signals are shrinking to a niche of applications and could totally vanish. In parallel, the capacity to "full" secure digital transactions will become more and more crucial for network and information trust and dependability.

Even more important, especially in Europe, recent history shows a progressive shrinking of the technical and operational gap between the protection of information dealing with public security, defence, State security and criminal law enforcement on one side, the protection of the "civil applications" in the information society (e-commerce, e-health, e-government, e-learning, etc.) on the other side : not that the equipment and procedures would be identical between these "regalian" and "societal" uses but rather that they will be based on similar techniques and implemented according to more or less robust architectures and security policies. In that sense, the network and information security policies developed by the European Member States and the European institutions started from remote positions but are now evolving rapidly towards each other.

National policies were for long based on the primacy of intelligence and a restrictive use of cryptography ; however they have evolved to meet the need for confidence and security in respect of all socio-economic exchanges in the high performance information society that Europe and the Member States are striving to build. Given the different socio-economic players, wider access to tools and services that offer high levels of security for all their exchanges goes hand-in-hand with the strengthening of the capacity to combat criminal acts. National policies are differentiated now by the relative weight of their different components and the different degrees to which they are integrated institutionally, technologically, and methodologically.

The EU, in contrast, had no previous history in the intelligence field and was continuing to pursue its economic and monetary policies based on the rights of individuals and on the economic competition regulations. However, the EU is today facing constraints inherent in developing a joint foreign policy and a joint security and defence policy. IT security has become a dual theme and the Union is seeing its operational responsibilities increase substantially.[1]

[1] See for instance "*Information security : a new challenge for the EU*", Alain Esterle, Hanno Rank and Burkard Schmitt, Chaillot Paper n° 76, Institute for Security Studies, March 2005

Over the next ten to twenty years, the interaction of these two thrusts at the national and European level will probably be one of the key issues for the evolution towards coherent and complementary network and information policies in Europe.

Within this scope, identification and authentication of actors is becoming more and more important both for a collectively secure social organisation under the state responsibility and for trusted electronic exchanges in an information society : the generalization of wireless and dynamic connections, for instance, should lead to a much more systematic use of tunnelling tools ensuring authentication, signature and ciphering for the protection of confidentiality, integrity of the messages and the non repudiability of the commitments.

But at least two types of identity seem to be developing in parallel, possibly in competition.

Firstly a cryptographic identity is based on asymmetric keys. Beyond the current SSL, IPSEC or S/MIME protocols, this cryptographic identity is the basis for digital signatures. The system needs a certificate (from a public or private entity) proposing evidence that a given asymmetric key corresponds to such individual, or more generally a Public Key Infrastructure setting a "trust of confidence" able to provide the ultimate proof of this correspondence between a cryptographic key and a human being. This identity remains temporary (needs to change the keys) and the structure is easily complex, especially for large number of people (validation of certificates, time stamping, lists of revocation, etc.).

Secondly, a biometric identity is built on personal physical or biological characteristics such as finger prints, retina or iris of the eye, hand pattern, DNA, etc. These techniques have been used for long by countries setting up national identity cards systems, but the point is now to bring these techniques into the electronic support from the first moment of biometric data capture to the final authentication process (ICOA decision, EU directive). The biometric techniques are simpler (no need to keep and protect a secret, long term validity of the data) but present a number of difficulties : possible collisions (two individuals having the same fingerprints for instance), fraction of the population unable to provide data (crippled individuals), significant rate of false reject and false accept, easy accessibility of the data without the owner's consent (fingerprints left everywhere), impossibility to change the data when compromised, etc.

But beyond the security of a given action (exchange of electronic message, authorized access to a building or to a country) both techniques have in common that multiple traces of the identity are left everywhere (cyberspace and real world as well), possibly allowing to re-establish the list of actions undertaken by each one.

Two types of problems may arise:

- What meaning for a multiple identity based on biometrics and cryptographic data?
- What respective value (juridical for instance) for the different identity components?
- What guarantee for the protection of privacy in this context?

All countries moving towards information societies should be facing such issues. Building on its technical and scientific excellence, on its high level in juridical and social analysis, on the Charter of Fundamental Rights, Europe is in the best position to address it now.

IST Policies and Strategies around the World: Competitive Strategy and Social Inclusion: Real or False Trade Offs?

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I. Introduction

Stockholm is one of the leading ICT centers of Europe and home to a significant share of Sweden's immigrants. It provides a useful case study for exploring the question as to whether social inclusion and the advance of an ICT-based economy and competitive strategies are mutually supporting or potential at odds with one another. In this short paper, I address various ways in which one can conceptualize the potential trade offs between diversity and social inclusion. I first explore the key potential drivers of diversity. I then examine areas where ethnic and gender diversity and competitiveness are not in conflict with competitive strategies. I follow by exploring areas where ethnic and gender diversity are in conflict with competitive strategies. I conclude by examining policies that would reduce the extent of conflict between social inclusion and competitive strategies.

II. Drivers of Diversity

The over all model by which we can evaluate the drivers of social inclusion are that it is promoted by several key factors. These include: a) growth or labor demand; b) supply, related to skills, qualification, training and competence; c) membership in a specific sector and economic restructuring; d) scale or size of firm; e) governance systems or policies to promote social inclusion; f) a host of related family friendly or training policies that encourage potentially excluded groups to enter ICT firms.

The first factor, growth of labor demand, suggests that women and immigrant background or ethnic groups will be brought into ICT firms as they grow larger in size. As such groups have traditionally been excluded, they may come to represent the new groups that are recruited as companies seek to hire new workers.

The second factor, labor supply, suggests that the attributes or qualities of the work force influence the ways in which they are included or not. Key factors include human capital or skills, work experience (for example skills working with particular computer systems), language capabilities (or the existence of language niches like English that may make it easier for immigrant background groups to work), and academic qualifications (including credentials or specialized courses of study).

The third factor, economic sector and economic restructuring, relates to how a specific kind of ICT firm may be more or less vulnerable to economic restructuring. On the one hand, manufacturing intensive firms have historically provided bridges into jobs for women and immigrants in Europe. On the other hand, manufacturing intensive work for a variety of reasons has been particularly vulnerable to outsourcing.

The fourth factor, scale or size of firm, relates to different advantages and disadvantages firms may have in contributing to ethnic diversity. On the one hand, smaller firm managers may be more reluctant to hire immigrants because they are under-unionized or have misguided beliefs

that immigrants will threaten their "fragile" work cultures built around a small number of persons. On the other hand, immigrants who establish high technology firms often gain a foothold to sidestep established hiring biases by creating their own small firms.

The fifth factor, social inclusion policies, relate to specific policies to promote the training and hiring of women and immigrant background groups. These policies include systems to encourage such groups to enter the school to work trajectories leading to an ICT career at the pre-secondary, secondary and university educational levels. They also include policies by universities to combat discrimination or promote a more supportive environment for women or immigrant background groups.

The final factor relates to specific systems that firms may deploy that indirectly or directly encourage diversity. One policy is to train employees directly without relying on universities to do so. This policy potentially encourages diversity for groups excluded from (or not entering) the university. Another key policy relates to system to subsidize family leave, making easier for mothers and fathers to take time off from work. A third policy relates to flexible or diminished work schedules that allow workers to work at home or work less.

III. Factors Influencing Diversity and Competitiveness Issues

I have summarized the impact of various factors related to social inclusion and competitiveness in Table 1. This table is based on two studies. The first is a survey of ICT firms in Kista Science City, a science park based in Stockholm. The second is a study of over thirty firms in one ICT firm which explored various factors promoting and retarding social inclusion. These studies were part of my research for the IST-financed project, "The Regional Impact of the Information Society on Social Inclusion and Integration," RISESI.

As can be seen, fast growing transnational firms, which use English and are able to hire many workers, can be a source of inclusion for women and ethnic employees. Often such firms promote flexible work schedules, allowing employees to work at home, reducing commuting time or allowing proximity to families when working. Yet, the global competitive drive to save costs by externalizing training, increasing work hours, and outsource work, each complicate social inclusion (for women, immigrant background groups or both). In some cases, however, immigrants setting up their own firms may promote social inclusion in smaller companies. Yet, such workers often turn to native groups, not co-ethnics, in order to build social capital, contacts and unique skills. Our research suggests the entrepreneurial option is not likely to promote many jobs for women and co-ethnics.

IV. Policy Alternatives and Conclusions

In summary, there are real trade offs between social inclusion and various competitiveness strategies, although growth policies leading to increased labor demand will promote social inclusion by expanding the hiring of diverse sorts of workers. Companies taking a very short-term view of what works in the global market may miss opportunities for experimenting with policies that make their workplace more "worker friendly." Being worker friendly in this instance means facilitating the ability to combine work and family life, encouraging both subsidized family leave and reduced work hours. In theory, a more friendly work environment will be more likely to attract workers, assuming that a firm can afford to produce the superior environment. Some workers may take reduced pay, however, in order to gain the benefits of such an environment. A better environment may very well increase productivity and thereby diminish the need for pay reductions.

Table 1: Key Factors Influencing Social Inclusion in Stockholm and Kista Science City Firms (Stockholm)

Variable	Positive Effects on Inclusion	Negative Effects on Inclusion	Competitiveness Issues
Labor Demand	Growth promotes hiring of women and immigrant background groups	None	More competitive firms should grow faster
Labor Supply: Human Capital	Once in the applicant pool, university qualifications not a key barrier for women and immigrant background groups	Women are increasingly dropping out of the application pool	Companies often externalize training to save money, reducing prospects of inclusion
Labor Supply: Work Experience	Companies providing training help women and immigrants get a foot in the ICT work world	Employers with difficulty hiring both women and immigrant background groups claim many lack required work experience	Companies often externalize training to save money, reducing prospects of inclusion
Labor Supply: Language Capacity	Use of English promotes inclusion of immigrant background groups	Few employers argue that this is a major problem	Often companies must launch globally first, placing a premium on the use of English
Labor Supply: Academic Qualifications	An increasing number of immigrant background groups have entered ICT related educational pathways in the university	A decreasing number of women have entered ICT related educational pathways in the university	Some companies emphasize work experience over the university system as a supplier of labor to gain the latest competence, but increasingly find that the universities have the latest competence
Economic Sector and Restructuring	Manufacturing centered firms have higher rates of inclusion for women and immigrant background workers	Many manufacturing jobs and lower level qualified ICT jobs in data support are vulnerable to outsourcing	Restructuring places limits on social inclusion and with global firms it is unclear whether functions eliminated by sourcing work in one lower waged region will lead to expansion in another higher waged region
Scale or Size of Firm	Smaller firms are a launching pad for women and immigrant background groups to sidestep discrimination	Smaller firms may feel more vulnerable to diversity	Networked firms may have advantages in inclusion and competitiveness
Social Inclusion Policies	Universities may promote outreach and bridging programs to include working class, immigrant and women students Companies provide mentoring systems Neither policies are very comprehensive, however	None	Companies may support government intervention to support a level playing field and qualified workforce because of competitive survival
Family Leave	Government policies in Sweden make it easier than other countries but workers still face time pressures and can lose income	None	Companies often will try to save money by getting the most out of their workers
Flexible and Reduced Work Hours	Flexible work and reduced work hours should promote integration of work and family	None	Companies often make employees work 50 hours a week or more to sustain profits and reduce costs for highly qualified persons

Universities seeking to promote employment for their graduates and companies seeking the state of the art knowledge provided by universities may try to cooperate more closely in order to provide identifiable pathways leading to jobs for women and immigrant background groups. Internships are often a key way to provide immigrants with key work experiences that allow them to break into their first permanent ICT related jobs. Governments may try to subsidize such internships with income payments or tax reductions on an experimental basis to assess strategies that would promote social inclusion and company training needs. The access of immigrant groups to global webs, should also provide a foundation for diversity, but ethnic entrepreneurship in the high technology sector may not be the best way to advance diversity.

"Policies and Strategies for interdependent economic and technological efficiency"

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Understanding the move towards a competitive Knowledge Society requires going beyond the analyses of single technological developments or even of clusters of innovations such as those related to the concept of Information Society. To understand advanced growth processes it is necessary to consider all the direct and indirect effects of wide changes such as terciarization or the development of less energy/material contents in economic activities. The functioning of interdependence of sectorial productions and prices, as portrayed by input-output models, is essential for this deep, meso-economic understanding of technological change.

The extensive literature on technological spillovers (Wolff, 1997), on the distribution of the benefits of innovation (Carter, 1990) or of TFP gains (Fontela, 1994) provides evidence and explanations of the role of changes in sectorial structures on growth, and has substantially completed the pioneering theoretical intuitions of Baumol (1967) on unbalanced growth processes.

The introduction of IT and more broadly the change towards "knowledge" intensive processes in manufacturing, associated to the changes of demand patterns towards services, are so deep that production structures are likely to be very different in 2020 from what they are today: technical coefficients (in input-output models), that moved slowly even in the post-war reconstruction years, are likely to change substantially.

As these structural changes will play a great role in the competitive capacity of advanced industrial countries (including on their capacity to compete with low wage producing countries), it will be increasingly felt that there is a need for economic and technological policies taking explicitly into consideration structural efficiency, and this will require strengthening research capabilities for the analysis of economic and technological interdependences.

In this particular context, the two main policy lines correspond to the two transformation processes operating in interdependent structures that are known as the "substitution effect" and the "fabrication effect" (in the input-output model the first is identified with changes in rows, such as increasing use of electronic devices by all sectors, and the second with changes in the columns such as new coefficients for the office machinery sector).

The "substitution effect" policies have to do with reducing the relative price of new technological input devices (including policies for increasing competition) or with stimulating demand (including incentives for acquiring or renewing technological devices); the "fabrication effort" policies are mode in line with the traditional industrial policies supporting sectorial technological change, but in this case it is probable that the more likely sectors asking for restructuring policies will be in the services area (in fields like education or health, that are essential for the Knowledge Society).

The fundamental issue of the Knowledge Society is to be related to a transformation of the quantity-quality-price mix of goods and services. By introducing "knowledge" into products, and adopting technologies that allow for this knowledge increase, society is opting for massive changes in relative prices reflecting the added quality of knowledge (an advanced

labour-intensive activity). These changes in relative prices at the intermediate and final market levels will necessarily induce new demand structures by households, administrations and business firms, affecting quantities and qualities in production processes. This new form of dynamics of the economic processes in the Knowledge Society also requires in depth research.

While we may be moving into a new long-wave of innovations (the paradigm of the Knowledge Society technologies of the bio-nano-info-cogno convergence) our understanding of the structural consequences of these innovations on the final competitiveness of our economies has not yet been sufficiently analysed with due consideration to the underlying interdependences.

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L'Europe de 2020:la construction d'une économie territoriale de la connaissance

Laura Garcia Vitoria

Nous nous proposons dans notre intervention de faire le point sur **trois exemples** qui nous apparaissent majeurs **pour répondre à quelques-unes des questions posées à l'occasion du colloque et relatives à l'Europe de 2020**:

1 - le développement en Europe des programmes de ***villes de la connaissance***, en Espagne notamment, mais aussi en Italie et en Allemagne par exemple- on ne peut plus évoquer l'avenir d'une société européenne de l'information dans un monde globalisé sans suivre de telles démarches -.

2 - la mise en oeuvre de *véritables stratégies de Lisbonne à l'échelle locale*, au travers des démarches de **quartiers apprenants** - développement qu'illustre bien l'exemple de Poblenou à Barcelone que j'ai tenu à présenter il y a quelques semaines dans le cadre de *Global City* à Cannes dans le cadre d'une typologie de démarches similaires en Europe -.

3 - **la mise en oeuvre de stratégies d'itinérance cognitive et d'échanges de savoirs à l'échelle des territoires**, grâce par exemple aux divers outils dont les technologies de géolocalisation et de marquage de l'espace permettent dès aujourd'hui le développement, et qui constituent aujourd'hui des expérimentations parfaitement emblématiques de nos analyses de prospective territoriale, et ce notamment en Scandinavie et en Grande Bretagne.

L'exemple des villes espagnoles analysées dans le cadre de notre programme européen - «Villes de la connaissance».

Laura Garcia Vitoria

Les premiers programmes de villes de la connaissance en Europe résultent des initiatives prises par les collectivités territoriales espagnoles. ***Las ciudades del conocimiento*** ont constitué en Europe les premiers espaces et de la gestion locale des processus de capitalisation des savoirs et des connaissances. S'il y a ainsi un plan stratégique d'une collectivité à suivre, c'est bien celui de **Burgos**. Annoncé dès 2003, il vise à faire de la ville en **2015** une cité de la connaissance, ce en s'appuyant notamment sur le développement d'un parc technologique. C'est un peu d'ailleurs la même direction qu'entend prendre le plan ***Bilbao 2010*** (avec le programme d'apprentissage tout au long de la vie mené par la municipalité et surtout la création à Zorrozaurre d'un espace d'implantation d'activités permettant l'utilisation de services avancés, future ville à part entière d'une « ville de l'innovation et de la connaissance ». De même en est-il du programme « **Coruna**, ciudad del conocimiento », où peut-être la dimension de l'administration électronique locale de la ville de La Corogne se veut plus précise. ***Séville 2010*** - qui se définit elle aussi « ville de l'innovation et de la connaissance » s'est fixée des horizons encore plus larges : **son centre historique a ainsi pour vocation de devenir dès 2004 un « quartier de la nouvelle économie de la connaissance »**. Une restauration d'une quinzaine d'édifices doit notamment héberger « les activités spécifiques d'une économie de la connaissance ».

C'est la même insistance encore que l'on note à **Huelva** qui entend se convertir en « cité du savoir, cité de la connaissance ». A **Saragosse**, à travers le programme ***Zaragoz@ccessible*** qui veut développer une « ciudad del conocimiento ». Ou encore à **Sabadell**, près de Barcelone, au travers de son « plan pour la société de l'information et de la connaissance » : la municipalité a ainsi crée une « Fondation des industries de l'information » pour mette en place des formations liées aux infotechnologies et capable de former les entrepreneurs de demain ; ceci parallèlement à l'Institut d'études et de recherche appliquée qui développe des fonctionnalités d'observatoire et de développement de projets innovants. Le plan ***Sabadell 2010*** souligne que la ville numérique qu'elle entend être viser la formation et la compétitivité territoriale. Le programme ***eDonosti.net*** s'insère quant à lui dans le cadre du projet Urban dans lequel la cité de San Sebastian est engagée. S'appuyant comme tant d'autre sur la gestion de son identité et de son inscription patrimoniale, la collectivité s'y décrit en termes prospectifs de ville de la créativité et de l'innovation…..**Elche** propose une dimension particulièrement intéressante dans sa réflexion stratégique : elle conçoit le champ de l'e-administration comme **« instrument de gestion du changement de modèle urbain** », une approche que nous entendons suivre plus particulièrement dans les années qui viennent.

Getafe, dans la région de Madrid, souhaite quant à elle, viser une situation de réelle compétitivité territoriale, avec par exemple un plan de qualité pour la gestion municipale. **Grenade** voit l'Institut municipal de formation s'appuyer tout particulièrement sur un centre des nouvelles technologies. **Jerez de la Frontera**, près de Cadix, a crée dans le même esprit une bourse virtuelle du travail, mais également un amphi virtuel de téléformation. « **Leon Ciudad Digital** » porte de la même manière l'accent sur les questions de formation.

Former, former encore constitue ainsi un leitmotiv pour les collectivités territoriales en Espagne avec les initiatives de ***Burgos Ciudad XXI***, prévoyant des cours de formation pour les jeunes en difficulté et leur permettre d'accéder aux infotechnologies, des cours de

formation aussi pour l'ensemble du personnel municipal. Les stratégies d' « integracion sociolaboral » seront également à suivre dans le cadre d'un programme tel que ***Ciudad Real : Ciudad empressarial virtual***. On se reportera à la liste des exemples sélectionnés dans le cadre de l'annexe fournie à la fin de la présente synthèse.

Why is IST a Crucial Factor of Competitiveness in the New Member States?

Pál Gáspár and Renáta Anna Jaksa

The recent gaps in productivity growth and competitiveness among advanced economies have turned the attention to the role played by the ICT sector in explaining these differences. The numerous econometric and analytical studies (van Ark (2002), Gros-Daveri (2004) or ECFIN (2004)) reflected the key explanatory power of the contribution of the ICT in explaining the differences in growth performance. The cross country analyses have also shown that while the ICT sector itself contributes to the differences in growth and productivity performance, the major difference lies with the extent of the application of ICT (referred later as IST) by individual countries. The few studies on New Member States (NMS) (Bart-Piatkowski (2004), World Bank (2004)) confirm the role of IST in explaining differences in growth and competitiveness in this subset of countries.

There are three major differences between the NMS and the EU-15 concerning IST and competitiveness. First, there is a huge and sometimes widening gap in the major Lisbon indicators and economic development between the two group of countries notwithstanding the fact that NMS grow much faster due to their real convergence. Second, while some NMS countries have relatively strong ICT-sectors, IST indicators are weak compared to EU-15 averages. Penetration ratios, access to broadband connections, costs of Internet access, spread of eCommerce and eGovernment lag in the NMS considerably behind the EU-15 levels with their obvious negative effect on their competitiveness and growth performance. Third, NMS countries face a number of structural difficulties and reforms including streamlining of their public sectors and reforming health care, education, pension systems, making their product and factor markets more competitive, reducing the emerging income and other disparities. While these issues are also important in EU-15, their extent and likely effect is much greater in the NMS.

This background points to a strong link between IST use on the one hand and its impact on structural reforms and competitiveness on the other in the NMS. There is a two sided causality between IST and structural reforms/productivity in the NMS. While the positive growth effects of structural reforms would increase demand for IST, the spread of IST would strongly encourage countries to carry out structural reforms and thus improve their competitiveness. Broader use of IST could directly result in productivity and competitiveness gains for NMS and indirectly stimulate public sector and market reforms that could have beneficial growth and competitiveness effects.

Why is the expansion of the IST so important for competitiveness and growth in the NMS? First, because the returns are higher and the likely spillover effect from reduced transaction and communication costs, better market access, wider information source may be higher than in the EU-15. Second, the broader IST use may lead to a more efficient public sector allowing savings in public expenditures. Finally, as there is a clear link between IST use and meeting various Lisbon indicators, broader IST use could give additional support to meet the Lisbon indicators.

To achieve this, NMS should focus at dismantling the factors that have so far hindered the spread of IST in these countries, including low income level and affordability of IST goods and services, lack of sufficiently competitive market conditions, inappropriate regulation of telecommunication sector, low priority attached in fiscal and structural policies to IST.

Moreover, existing structural problems (income disparities, existing social divides multiplied in digital divide, slow income growth, weak SME sector, short-term fiscal incentives, etc.) have also slowed down the pace of IST expansion.

What should the NMS do to reap the benefits of IST expansion? First, they need to address more vigorously the competitiveness and cohesion elements of the Lisbon criteria (especially where they have sizeable gaps compared with the EU-15) as they have a positive demand and supply side effect on IST use. Second, governments should devote much more attention to IST policies in order to reach critical threshold levels with penetration allowing afterwards their much faster spread. Third, they should carry out far reaching, broad based reform of the public sector, including such vital pillars as pension and health care, local governments and public administration and linking these reforms closely to the expansion of eGovernment and eHealth. Finally, structural reforms (product market, labor market and tax reforms) should be implemented and combined with competition and deregulation programs in order to eliminate monopolistic market structures.

How can the spread of IST and its contribution to structural reforms and competitiveness gains in NMS have European wide policy implications? First, the direct effect of broader IST use on public sector and structural reforms could result in a more efficient use of scarce resources, accelerating productivity increases and competitiveness gains by NMS. Second, this acceleration in productivity growth and competitiveness in NMS may spillover to other EU countries. Third, competitiveness gains in NMS allowed by the spread of IST may contribute to the long needed reforms in product and labor market, tax policy on a European scale.

To speed up the new drug discovery and development: what could be the contribution of Information Society technologies?

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The world wide pharmaceutical companies are facing an important challenge. Despite the tremendous amount of money invested in Research and Development (R&D) activities, they discovered less and less new and innovative drugs during the past decades. During the last 30 years, the rate of R & D investments grown exponentially but the number of new drugs grown linearly. More and more money are needed to discover an effective and innovative drug. Recent investigations shown that the average R & D costs for a new molecule were at least 800 Millions Euros. Moreover the R&D process is quite long. It spends ten to twelve years between the first patent and the first commercialisation.

Taking together these hurdles lead to the fact that new drugs are rare and rather expensive. But there is an undoubtedly need for new and cheaper medications.

The pharmaceutical R&D is classically divided in four phases: discovery, lead optimisation, preclinical investigation and clinical investigation.

IST could contribute in each phases to speed up the R & D process by rationalisation of the data processing and communication.

As an example most of the costs are engaged during the clinical phase. During this phase, a great number of patients (more than 20 000 in some clinical trials) are recruited and treated by the new drug or a comparator. The efficiency of the new drug is evaluated on a limited numbers of biological criteria based on data collected by physicians. By developing new devices to collect on real time biological data (blood pressure, temperature etc.), able to communicate automatically these data and so optimized the R&D process rendering it more reactive.

Several technologies coming from the IST could be used during the new drug R &D

- Massive data manipulation and data mining in huge biological data bases for new targets identification
- Complex system simulation: whole cell simulation, in silico drug screening, drug action simulation
- Virtual reality : virtual surgery, virtual chemistry

But pharmaceutical companies are not aware of the IST for many reasons but one of them could be the fact that these two domains are not connected by people able to bridge them. There is a need to include the drug in the IST foresight. Some of the world wide leaders are European companies and they could take advantage of a such reflection.

Summary CV:

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Society Bridge – A vehicle for changing our lives

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Abstract— Recent studies have shown that the IST will have an impact on all aspects of human life. Results of research in many branches are indicating clearly, that some of the crucial problems people have to deal with like diseases, learning, environmental damages etc., can be solved by the application of ICT. Some scenarios have been developed, trying to identify the trends, challenges and drivers that will govern this process in a near future.

Here a concept is presented, that could stimulate the application of new technologies in small population nucleus. A scenario illustrates the "Society Bridge" concept. This concept is considered as a basis for the establishment of small local share companies. Their principles can be both a motor for accelerating the introduction of new technologies, which may enhance the every day life of people, and serve the interaction between these small geographical limited, market oriented companies.

The concept pretends to incorporate retired people back into active social life. It also promotes the participation of people in all basic decisions related to their current problems, which is believed to stimulate the interaction with e-government and local authorities. Some retribution patterns and human resource methods are also exposed.

Even if the practical implementation of the concept may have great initial difficulties, it is very interesting to analyze its implications, because the results of its application are in line with the goals of the EU as stated in Lisbon. For facilitating the understanding, the concept is exposed as a scenario, where hypothetical developments are taken into account. The main drivers are recognized and the expected results are shown. In this scenario the main principles of companies created under the SB concept are developed.

Following this scenario the characteristic of the SB companies are considered.

The relationship between the principles of the SB companies and the EU goals is presented. Some of the difficulties and threats to the application of the concept are highlighted. The presentation is meant to be a basis for thinking and the intention is to open a discussion about this possible social innovation.

ICT in education and training – supporting innovation and lifelong learning for all

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In his closing speech at the recent *e*Learning conference in Brussels[1], Mr Adamiš said "*ICT is offering us the possibility to reform our systems, to implement new ways of learning and to achieve our vision of lifelong learning for all. But more than this, ICT is acting as a catalyst for change and a facilitator for innovation*"[2]

His comments reflect a significant change in emphasis that we have seen in E-learning over the last decade. Away from a focus on technology, connectivity and the Internet, towards a greater consideration of the context for learning, and of the need for collaboration, communication and innovation. We are concerned less with the prerequisites for learning and more with the benefits; what motivates us to learn; how does learning help us to develop the key skills we need for the knowledge society – such as creativity, innovation and critical thinking; and how are these affected by the use of ICT? After all, e-learning is still learning. And learning is primarily a social activity, with as much to do with building self-esteem, confidence and a place in society, as it has to do with acquiring skills and knowledge.

The *e*Learning conference raised a number of issues which need to be analysed and addressed over the next year, together with the various stakeholders.

1. **Human capital**, skilling and re-skilling are terms increasingly being used in our arguments about the need for the workforce to remain flexible and adaptive for competitiveness and growth. But we mustn't forget that the best solutions for human capital try to accommodate the needs of the employer, individual and society in a balanced way. Much more can be achieved by ensuring goal congruence and by looking at **social capital** as well as human capital.

2. **Social inclusion** emerged as a key issue at the conference. We need to help those who would like to work to get back into the job market. We need to support and encourage lifelong learning, not only for work, but as a means of building communities, of increasing cultural awareness and of supporting minorities. ICT can help tailor and deliver learning to people wherever they are; at home, at work, in libraries, in community centres, the possibilities are endless. But how do we do this in a way which reduces the inequalities in life and provides learning opportunities for all?

3. Ensuring that everyone in society has **digital competence** is emerging as one of the key challenges for the Knowledge Society. This goes beyond basic ICT skills and reflects a person's ability to use ICT for critical thinking, creativity, innovation and other higher cognitive skills. Digital competence is the term coined by the working group on key competencies under the *Education and Training 2010* work programme. They prefer it to

[1] *e*Learning: Towards a learning society, Brussels 19-20 May 2005 http://www.elearningconference.org/

[2] Mr Adamiš , Head of Cabinet for Commissioner Figel', closing speech http://www.elearningconference.org/press_entry/index.htm#now

digital literacy as competence reflects '*a combination of skills, knowledge, aptitudes and attitudes*'[3]

4. The **ageing population** is presenting us with a major challenge for the future in terms of meeting employers' needs for a skilled workforce. The existing workforce needs to be encouraged and supported to skill and re-skill. In this respect, how can ICT help?

5. **Informal** and **non-formal learning** are just as important, if not more important in some cases, than formal learning. We need flexible ICT approaches which help to combine formal, informal and non-formal learning. E-learning and knowledge management should be seen as complementary disciplines with close inter-relationships. ICT supported learning should encourage collaboration, communication and networking (eg through communities of practice).

6. **Content** remains an essential component in e-learning. However, there are clear differences emerging between 3rd party, proprietary content and content produced by teachers and learners themselves. The former should be high quality, interactive and professionally produced (e.g. as produced by the BBC). It is likely to be expensive to make and producers will want to protect their IPR in order to obtain a suitable return on investment. The latter is likely to be an essential element of the learning itself, in that its value is in its making as part of a constructivists approach to learning (Jim Devine called this ad-hoc, not-for-publication content[4]). We traditionally recogniser the value of 3rd party content but have so far underestimated the value of the ad-hoc content. Even for 3rd party content, Hans Ulrich Maerki of IBM suggested at the conference that all proprietary content will eventually become *open* on the internet[5].

7. Whereas ICT remain a powerful tool for supporting learning, its real value is as a **catalyst for change**, fostering innovation in learning and organisational processes. Indeed, an important element coming out of the conference was the need to reinforce organisational change and innovation as facts of life for competitiveness and social development.

8. We need to have a **holistic approach** to e-learning, covering all the elements such as infrastructure, content, pedagogy, legal frameworks, education and employment systems, etc. "**Multi-stakeholder involvement** is paramount and should become systematic. Governments, business and industry, students, teachers and the society at large should all participate in the elaboration of a new strategy." said Yves Punie in his summing-up at the conference[6].

So the final message emerging from the conference is that we need to work together in partnerships if we are to make best use of ICT and achieve our vision of a learning society for all. We hope that the Fistera conference will provide us with additional insights and help us to build further partnerships for success in this important area.

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[3] Working Group B "Key Competences", Key Competences for Lifelong Learning: a European Reference Framework, November 2004. http://europa.eu.int/comm/education/policies/2010/doc/basicframe.pdf

[4] 'Not-For-Publication content: a case of neglect', Jim Devine, http://www.elearningconference.org/key_speaker/devine.htm

[5] 'eLEARNING: A Service-Oriented Utility For The Knowledge Society', Hans Ulrich Maerki http://www.elearningconference.org/key_speaker/maerki.htm

[6] 'eLeaning is important and it should be more so', Yves Punie, http://www.elearningconference.org/press_entry/index.htm#important

The Estonian ICT Manufacturing and Software Industry: Current State and Future Outlook[1]

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The existence and development of ICT manufacturing and software industries is of great importance in the long run for any country as these industries directly or indirectly contribute to the production and export of internationally competitive products and services. At the same time they maintain or increase people's real income.

Empirical evidence (exports-imports, ownership, FDI, value-added, etc.) shows that the Estonian ICT manufacturing sector is actually part of the larger Nordic ICT manufacturing cluster. The main branches of the Estonian ICT manufacturing industry are exactly the same as those of Finland and Sweden. ICT manufacturing network flagships generally consist of the Finnish and Swedish companies, which have subsidiaries, affiliates and joint ventures in Estonia. Empirical evidence does not support the widely held view that Estonian ICT manufacturing has been gradually moving from low value added manufacturing towards higher value added production.

Although participation in global production networks has potential for knowledge transfer, it is not automatic and requires a significant level of absorption on the part of local suppliers, who have to master a complex process in order to internalize disseminated knowledge. Currently most of the Estonian ICT manufacturing industry acts as a "lower-tier" supplier, its main competitive advantages being low cost ("price breaker"), speed, and flexibility of delivery. At the moment, existing ICT manufacturing companies are expanding and new ones are being established, as a result of Estonia's relatively low cost labour. However, real wages have risen much quicker than the overall productivity of Estonian economy and Estonian living standards are expected to converge with those of EU, leading to the loss of this advantage. As technologies and products mature, the stronger the cost-competition will be. Several flagships that currently have ICT manufacturing in Estonia are also expanding their manufacturing activities in China and other low-cost regions. As these parent companies face stronger and stronger cost-based competition, it is most probable that they will be forced to look outside Estonia for cheaper production areas in the long run.

Ambient Intelligence (*AmI*), expected to be a reality by 2010, envisages an Information Society where the emphasis is on greater user-friendliness, more efficient services support, user-empowerment, and support for human interactions. Basically, this vision argues for the extreme clustering of ICT manufacturing and software industries with other industries and service sectors. As Estonian companies have made an impressive success of the application of new technologies in some fields (banking, government) and in the development of intelligent user-friendly interfaces (for example, in the fields of mobile telecommunications, and e-health applications), they could also be successful in the realisation of the „*AmI Space*".

Over the last decade, all industries in Estonia, particularly agricultural and resource-based industries (food and wood processing especially), have been very successful in modernizing

[1] Tarmo Kalvet, *The Estonian ICT Manufacturing and Software Industry: Current State and Future Outlook*, Institute for Prospective Technological Studies - Directorate General Joint Research Centre, European Commission: Sevilla, 2004. http://www.jrc.es/home/publications/publication.cfm?pub=1200

companies and making them competitive, mainly via technology transfer from abroad. A further boost to productivity could come from clustering of the software and, to some extent, the ICT manufacturing industries with other branches of industry, although the currently low level of R&D investments by Estonian enterprises is a possible threat.

Incentives to innovate in ICT industry will most probably arise in the service sector, as a result of continuous modernization in the public sector and innovations in the services field. Although these service innovations are relatively easy to implement, they are also difficult to export, as their competitive advantages are very much based on local specificities. Thus, only some of the already established companies that are plugged into global research, development and production networks will have success in exporting their service innovations to other countries.

The story of Estonian ICT manufacturing industry and its current challenges is by no means unique, all (new) member states are facing similar pressures. In more general terms the question is of adopting to new techno-economic paradigm. According to the widely accepted theory of techno-economic paradigms, similarly to scientific paradigms (Kuhn, 1962), there are also technological paradigms that determine the technological problems, scientific principles and material technologies to be used as well as the whole socio-economic reality (Perez, 2002; Perez, 1985). All industrie end up being modernized by the new paradigm, through the introduction of the generic technologies (as ICT now) and the new organizational models, which offer superior productivity across the economy. The social effect of all these change processes includes the creation of a demand for new structures in labor and education, and the dismantling of the old ones, as well as changes in key social and cultural patterns of life (e.g. urbanization, mobility, networks). This also challenges the basis of the political sphere, in that changed participatory structures transform the political cohesion of a community.

There are many strategies around the world showing how one can become really ICT-advanced nation (excellent overview is From Underdogs to Tigers, The Rise and Growth of the Software Industry in Brazil, China, India, Ireland, and Israel), although several critical success factors mentioned there are rather difficult to implement in (new) member states.

IST Policies and Strategies around the World

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In spite of the economic crisis of 2001-03, the Information and Communication Technologies (ICT) industry remains a siginificant part of the European Economy. However, the pace and levels of ICT industry sector development vary quite widely between the different EU countries. Most EU countries have enacted policies to build-up or enhance a national ICT goods producing and ICT services industry. TNO Institute for Strategy, Technology and Policy (The Netherlands), Louis Lengrand & Associés Sarl (France) and Fraunhofer Institute Systems and Innovation Research, ISI (Germany) carried out a benchmarking exercise of policies in support of the ICT sector competitiveness for the European Commission (DG Enterprises, D4). This study has identified, analysed, and assessed more than 175 examples of national and regional policies that were implemented in the EU15 Member States in the last 5 years. First, national practices for ICT sector policy were identified and classified. Policies to support competitiveness of the ICT sector can be divided into three categories, corresponding broadly to the types of policy instruments they employ: vertical policies, quasi-horizontal policies and horizontal policies. The analysis indicated, that only a few types of policy instruments are commonly deployed in most countries. In a next step, the 175 identified policy programmes and initiatives were benchmarked against a small set of qualitative criteria that included a mix of general and specific good practices. Selected examples show that a number of good practice elements are essential for the design and implementation of national and regional ICT sector policies and would enhance policy making in all EU countries. These elements for good practice can be presented and discussed at the conference.

IST Visions and Foresight

FAZIT, a recently started foresight and monitoring project on the IT and media industry in the German region of Baden-Württemberg, is one of the projects which could be presented and discussed at the conference. The author is very interested in learning from other initiatives and projects with this kind of focus.

FAZIT – "Forschungsprojekt für aktuelle udn zukunftsorientierte IT- und Medientechnologien und deren Nutzung in Baden-Württemberg" (Research project on the future of IT and media technologies and their use in Baden-Württemberg) is a joint project of Fraunhofer ISI, MFG Stiftung and ZEW and analyses systematically the current and future developments of the IT and media sector in the region. It started in January 2005 with a duration of four years.

Because of the central relevance of the IT and media sector with about 22.000 firms and a contribution of about 10% of the GDP of the region, this study offers fundamental insights and knowledge into the sectors research and business activities.

The project consists of four modules:

(1) Monitoring of the sectors demand and supply sides in the region on a basis of frequent surveys during the project.

(2) Foresight/Future Studies by analysis and research of the impacts of long-term trends in society, technology and economy on the sectors performance. Methods applied and combined are Delphi surveys, scenario analysis and an final roadmap development.

(3) Knowledge Transfer of the research results to the public and scientific community throughout publications, transfer events, an internet platform (www.fazit-forschung.de) and conferences.

(4) ongoing further development of the research methodology as a integrated combination of monitoring and foresight activities with involvement of external experts and regional actors of the sector.

The development of the use of Internet: towards a glocal (global - local) trend

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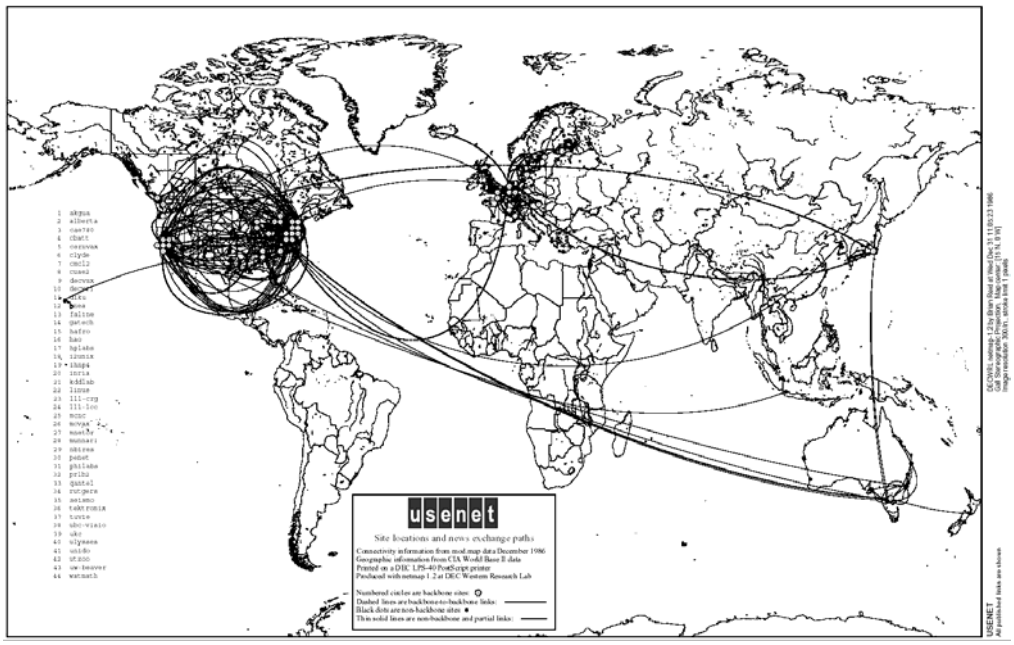
This paper aims to underline the fact that Internet, which was originally built to promote contacts, cooperation and ways of working overcoming time and space constraints, is now also used to foster communication and development at local level.

Internet: towards an "overtaken distances world"

The main drivers for the development of Internet in the past were the need of secure transactions between different local nodes for military and research issues. During its different development steps, from ARPANET to the actual Internet, the idea was to facilitate online communications throughout the world without any distance or time constraints. A common vision of Internet development consequences was the building of a Mc Luhan' "global village"[1] composed of different communities sharing common interests and communicating over the world. The world itself was supposed to become a "cyber world", getting over any geographical boundaries. In this vision, the major uses of Internet were based on research, education, thematic forums, etc. The architecture of the network (cf. the Usenet network in 1986) was the reflection of this vision.[2].



The communication paradigm

In this global village' vision, it seems that one issue has been ignored: Internet is only a communication tool, very powerful, that facilitate the share of a large amount of information via the web. However, a tool is designed to answer to a need, but cannot radically modify the

[1] Cf. http://www.richmond.edu/~jpaulsen/cvanetgv.html as an example of this vision
[2] http://www.cybergeography.org/

substance of the need. To give an example, we cannot say that mobile phones have radically modified the need to communicate whatever the place we are. This need already exists since the ancient times if we refer to messengers, to written correspondences etc. It has only facilitated the process and enhanced the opportunity to communicate.

Our opinion is that it is the same phenomena that we can see through the use of Internet. Internet has not created a new communication paradigm; it has strengthened the existing one.

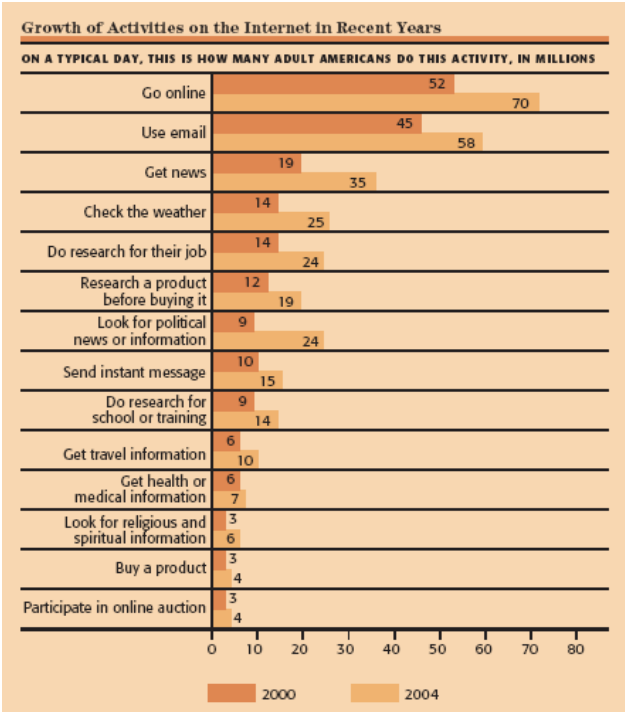
IST as a support to the globalisation trend

Since their origin, trade activities are based on the growth of exchanges with countries (Europe, Middle East, Asia, Africa…) and on new products (textiles, spices, coffee…). Other basis of trade activity is the research of time saving, a better communication between the different actors of the value chain, better exchanges within a group to favour efficiency, etc. Even dematerialization is a long trend in business activities and in economy.

As part of this way of thinking, the knowledge based society is not a new vision for future. In history, the society that holds the knowledge has always been the competitive one, as long as the concerned knowledge was collectively recognised as a dominant one (religion, philosophy, art, science, industry…) or supported by armed force. Knowledge based society can so be analysed as a shift in the global trend where knowledge becomes universal, shared (not only within an elite), and largely accessible (with the will to reduce digital divide).
Internet and IST tools so participate to a global trend and their diffusion and evolution are drivers that can be influent as catalysts.

For individual, local communication prevails over global communication

When we look at the use of Internet in 2004 in US, we can see that the three major services used are: "e-mail", "get news" and "check the weather".



Source: Pew Internet and American life project, *The mainstream of online life*, 2005

It can be said that in fact, these online activities cover two categories of services:

- Communication services (e-mail, but also chat, forum…)
- Information services ("get news", "check the weather", etc.)

If we first consider communication services, the issue is to know whether this kind of need is mainly a local or a global service, or if it can move from local to global. In the case of France, looking at the statistics produced by the ART (French Authority of Telecom Regulation) regarding the use of telephone, phone communications at local level represent 68% of the total of communication flows[3]. This situation is unchanged since the creation of the ART observatory in 1999. The fact that a part of these communication flows now use the Internet "e-mail" tool doesn't modify the paradigm that can be explain as "proximity is a factor that favour communication".

Many other examples can be cited according to this viewpoint: online chat communications that results to physical meetings, online games communication that leads to the organisation of matches in local tournaments, etc.

The information services issue is more difficult to assess. If we consider "checking the weather", we can easily conclude that local information is needed in most of the case. But for other information services, one can say (and this was a "global Internet vision" fundamental component), that the relevance of the information is more important than its localisation.

However, if we consider the development of Internet services, the major visible trend is that if the first web services were international or national ones, progressively, more and more new web sites and portals appeared at regional and local level. This is very true for e-administration services, but also for education, health, social, etc. services. Two main drivers can explain this situation: the first one is the current decentralisation process in European countries, and the second one is the 24h/24 online services' need as an answer to a more flexible way of working and living in today's Europe.

Our day to day experience as process consultants for the development of ICT shows that the main question we are faced with is the following: "how can I use ICT and Internet to foster sustainable local development and to support the creation of local clusters and networks (between human or institutional-economic actors)".

What we want to underline is that if ICT support the development of large scale communications (the 80's vision), the main issue of ICT in the future for individuals is certainly to foster the development of human / institutional relations at local level. Information society allows the development of a coherent e-services' offer at local level that could reinforce local cohesion and development. It is through this "glocal" trend that we suggest to understand the impact of the future development of ICT in Europe.

[3] http://www.art-telecom.fr/observatoire/stat/3-2004/statrim3-04.htm

Introducing the Next Big Thing: The Transactional Internet

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Key-words

Next generation Internet. mobility, ubiquity, synchronisation-less content integration.

Anytime, Anywhere, Any device convergence. Global and local (Glocal), societal shift.

Secured ID Identification, Authentification, Authorisation. Virtual banking. Transactional processing, Transactional mobiquity, Traceability. Seamless automated collaboration communication and publication, Information Organise & Recall engine, contentware. network usage, Metcalfe law.

User-centric operating system. Personal network. Digital individuality and identity. Virtual self. Person centric models over the Internet, seamless automated intelligent content agent, permanent content knowledge.

Abstract

The prospective vision of transactional systems that this paper discovers and promotes may have considerable civilisation impact as it off-centres the work-flows from the current highly clogged computer (and more generally device centric) end-users environments. The bottleneck phenomenon appears at memory, software and applications levels together while the vision re-centres the activity natively within the Web.

This article analyses these paradigmatic shifts and deduces the ineluctable advent of a personal content usage model based on the supply of transactional services via Internet. Such change will similarly spread to usage models based on other transactional services such as banking and telephone.

Just as application servers have revolutionised enterprise applications, integrated transactional services web delivery platforms will revolutionise personal productivity by providing everyone with on demand, over any terminal type, via adapted portals, personalised services needed by office automation, communication, content and knowledge management.

Introducing the Next Big Thing: The Transactional Internet

Today Internet is interactive: we like to "go to" a Webmail program, a search engine such as Google or an eCommerce site such as eBay. Because most of our browsing (as well as our emailing) activity is depending on the availability of a personal computer (PC), we tend to envisage the Web media as one of our local windowed programs. As an aggravation, even if wireless and other technologies have freed Internet access, an endemic user's desktop computing syndrome resists our freeing from windows programs: how to use digital content without worrying about file format, storage location and software dependencies to allow its processing? We just don't easily *"dwell in the Web"* and Internet *as we live it* does not

solution yet the fundamental *"Where is my stuff?"* quest. In a nutshell, our Internet experience isn't transactional.

The Digital-Human Paradox: from Moore's Law to Metcalfe Laws

Why is it that today I've become incapable to efficiently retrieve my different digital belongings across all the various storage instances and devices that I've been using? Because human efficiency doesn't comply with Moore's Law. The fast Moorean pace of increasing computing capacity compelled computer science to always optimise operations and storage at the expense of usage by separating content (data) from container (files). Result is that my phone numbers are located on my mobile phone and my documents are found in some tree structure of an exploring utility. While my photos are still in my digital camera and my emails can be accessed via some dedicated utility or Webmail service such as AOL or GMAIL…

This silo situation gets even more complex under the growing number of incoming users. Today computer based Information Systems are just not built for coping with more users bouncing back and forth on ever more users like balls in a flipper game… When the system gets running at global planet level we can expect conflicts to happen at various levels: system, architectures and usage. Of course, n-tiers architectures today consider networks as service platforms where contents are stored anywhere and client side can be reduced. But we are mostly still living in a Moorean age of affairs whereby our vision gets "linearly" extended via an arithmetic (doubling) increase in density of digital circuits (every year and a half or so). Hence the paradox: any flow that timely doubles its activity by mere replacement of its better components is bound to yield some productivity then more bottlenecks. Our desktop resources are… but a carbon copy of the top of a desk since the advent of the Apple Macintosh in 1984… How can we not expect interoperability problems, delays in co-operations, upgrade issues and costs, user dissatisfaction… to negatively impact our working and living then?

Fortunately enough, not all information systems really works this way…

To the contrary, our most universal and valuable systems - namely the telephone and the banking systems - are already seamlessly organising and monitoring all end users' actions, without requesting them for hard knowledge or even specific device investment.

How do e.g. banks accept to organise our payments everywhere, anytime and in an easy way? We can withdraw cash from Bali with a bank account in Seville. Reason lies in actuating a multilayered architecture, as follows:

1) At *client* level, the bank pre-empts my usages: it ignores why I cash money, while it knows how-to do it. Basically, the bank tracks each order and each payment and exonerates the client from accounting, summarising and securing his transactions.

2) At *market* level, the banking system unifies all transactions; in fact it integrates transactions.

3) At *bank* level, the banking system supplies the frames, the session log when I need a transaction to happen and traces all transactions securely.

In exchange of my behavioural honesty with respect to the banking system, the bank enables a value chain and a virtuous circle that produces more value at the output than at the input of a transaction. Now, multiply the number of users, what happens to transactions?

Robert Metcalfe was famous inventing the Ethernet Protocol. Yet perhaps his greater contribution is that, simply put, the value of a network grows with the square number of its

users. During the last seven years, wideband connexions multiplied, search engines began to index textual strings. Contents have exploded, the number of web URL grew from 2.2 to 65 millions and services have much increased. By applying Metcalfe's law to the banking system, we discover that a large increase of bank's clients can create a much bigger value.

Signposting an Architecture in Cyberspace: towards a generic Transactional APplication Protocol (TAPP)

What is a TAPP architecture? It is an integrated web services delivery portal platform that presents and timely delivers all requested services to the subscribed identified user. It is meant to totally supersede the *"Do It Yourself"* content and archiving management operation users are still bound to undertake in the filing and storage organisation of current devices. Such architecture can certainly be viewed as a Data Base Oriented Content manager (and one day Microsoft's WINFS may be poised to become such, as part of the Longhorn strategy) and remains fully device independent. In the *"anytime, anywhere, from any device"* universe, it removes the need to move, access and transfer contents.

A today implementation is made by one author as a 3-tier architecture based on Opens Standards (XML, SQL, Java Servlets) that can be deployed on any Web server. It accurately delivers WML, CHTML, XHTML, DHTML, JSP or PHP, any J2EE container, any RDB and any Server OS. By being consistently upgraded, a TAPP middleware is natively enabled to easily and securely connect to classical standard web services. It eventually may be connected to any pre-existing enterprise class application at a rather low cost of development and testing as long it supports EAI connectivity (EBXML, Rosetta-Net, SQL…).

A TAPP protocol implements an architecture similar to modern banking workflow where each transaction made by a bank account owner is seamlessly organised, identified and tracked. Just as the banking system organises any client's instruction – a transaction – and even before it is actually operated (i.e. a check note bears all that required in print, IDing numbers even before an amount, a date or a recipient is written on it). The TAPP organises each digitised piece of information resulting from using either common digital tools such as cameras, computers, handheld devices etc. and from working with applications. The identification and the traceability of the document and or data are organised by a TAPP even before the job is launched.

The user deals no more with data clogged in separated and not communicating environments (Outlook email archive, contact manager, mobile phone address book…) or with files that embed and hide digitised content in complex and hardly searchable trees on disks. For a TAPP, every piece of information is binary no matter if data or file, as it knows not files but Binary Large Objects (the 0 and 1 that compounds the document itself) and *meta data criteria* that relate to their generation, usage and history. Like a bank account stores, summarises and recalls all of one's past transactions no matter what way the client instructed his bank with, the TAPP considers all personal digitised content as a transaction and stores it within the registry of the subscribed user's data base on the server side.

A TAPP doesn't require a thick client since there is no software installed on the client edge. And not all users own an accurate thick client, plus the knowledge to use it, nor would each user need a thick client for all types of timely transactions…

There is even no need to use a "rich client", i.e. a PC that supports a Java Virtual Machine. For instance, I may need to telephone someone when away from my contact list and my TAPP enables me to browse through all the contacts through any mobile phone. Which means the searched number needs not be noted locally. And what's more, it will dial automatically…

A user will get even more benefits from any TAPP architecture when operating from a rich client. We do understand such configuration may be recommended as a workstation when user needs to work and produce through classical software applications. Of course one wouldn't write a long note from a mobile phone keyboard nor touch up pictures without accurate display and calculation power. Yet the result will likely be a document and it is the TAPP that would ease and simplifies user's life by handling the document so that it is retrievable and recallable easily, whenever needed and from wherever.

The Charter for Digital Human Rights

These vaster possibilities probably will require to delineate a code of conduct and usage. First, a usage charter can be envisaged. As human beings, users must be granted *three basic rights* when they dwell in a transactional digital world:

1) A *place* that they can label 'their home'. It is a location, a territory and comes through an *address.* Today, my favourite territory is perhaps my mobile phone for the reason that other people can find me. It's arguably the primary need to fulfil in digital ages. Personal computers have failed in providing such unique address and their getting fatter, with ever more hardware and software (hence consequential additive Moorean effects) is poised to become irrelevant to users.

This first right can be called the *Right to Exist:* I can digitally exist only if an "eMe" can be found (i.e. located in cybersphere) by at least another "eYou" and vice versa, thus forming a usable "eUs" network.

2) The possibility to *evolve* from there: to learn, to accumulate knowledge. This is the basic *Right to Know.* Such right confers the possibility to 'digitally live.' Living complements existence by adding levels of activities.

However, to enable that accumulation process, which sources personal economies and aggregates them, one needs another right, as follows (hence the whole value of this article):

3) The possibility to swiftly and safely effectuate *transactions* and yet to be granted the value resulting from transactions and not loosing it due to cumbersome content management. This is the basic *Right to Exchange.*

We hope to have hereby proven that the initial early 1990's vision of the founders of the World Wide Web is yet unfulfilled and that Europe now stands another round of opportunity at its fingertips. Truly enough, man can here also demonstrate that he can become a competitor of the regalian law system of nations whereby states create money-based currencies that only would enable such transactions. He becomes an economic agent able to manage exchanges by himself…

Wrapping up the Vision and its Developments

Clearly, the Web was invented in Europe. At usage level, it has unfortunately been reduced to a mere functional extension of modern computing and exploring tools. There is no reason to make this status perdure in the future. From a mere looking glass tool view, the Web has to become a systemic transactional medium, just like the telephone or the banking system. Today web usage isn't 'transactive' but merely interactive. Which means that it is consistently scripting a behavioural mode imagined by others. Today's Web is the sum of information as published by others, hence the relatively low productivity factor gain that I can still get from using it.

Thus, while the common ground to all human beings is to recall what they know and to only search for what they ignore, their today Web behaviour, for those who luckily belong to the digitised world, is exactly opposite! They hardly search for things they don't know and not easily find the published information: the Web serves them retrieving essentially other's content not their's.

We believe in and promote the vision of a Web whereby each single user can and will develop an own meaningful networking mechanism, by authoring own behaviours that source one's life.

In the late seventies the personal computing revolution substituted central mainframes based operations. We now reach the point in digital evolution whereby the societal impact of *"transactions anywhere anytime"* become the next frontier. There are about 1.5 billion mobile phones worldwide by now. On-going experiments in Cambodia show that we can expect millions of transacting users through mobile phones. Users will benefit from unlimited usage services that provide them with the digital rights constituency thus vastly increasing global economic value: from mobile access and ubiquitous interoperability they build their own usage world and this simply bears meaning to them. These users store nothing yet retrieve all. Their usage benefits are called interoperability, mobility, ubiquity, synchronisation-less content integration, contents convergence from any terminal. Flexibility in the evolution of Service Oriented Architectures tells that this usage model based on the supply of transactional services will become the norm. That's the unique and central place where users want to be, and well before 2020.

Yesterday's definitions of time and space have become too rigid for them and our society has taken up networks. Networks are in essence transactional. This is why, when living in the era of networks, Internet should become transactional. We hope to have even substantiated the underpinning vision within generic protocol architectures called TAPP. Will we be capable of exploiting that vision model and align with it R&D Programmes, companies strategies and dynamics and maximise the impact and visibility in time to reap its formidable benefits?

Barriers and facilitators of developing and implementing IST policies in health care in Europe, April 2005

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Background

The health care is sector will in the near future be confronted with the challenge of the increasing deployment of ICT applications. Broadband infrastructures and networks should make possible the delivery of ubiquitous and enhanced health care services to citizens and patients, create opportunities to innovate health delivery services, support individual practitioners and create opportunities for health information systems for governments.. Ehealth (ICT applications in health care) is expected to have a big impact on health care. e-Health has been identified as one of the priority objectives of the e-Europe 2005 Action Plan. It refers to health services and information delivered and exchanged through the Internet and related technologies. By 2008, health information and services are to become commonplace and accessible over both fixed and wireless broadband networks. Expected services include teleconsultations, prescriptions available online. So-called "Grids" are to be set up to boost the networks' computing power and ability to interact. Technologies are changing fast and the (financial) and demographic pressures are urging to seek for alternative ways to provide health care. However, health care is to a large degree characterised by technology push and financial pressures. Some fundamental challenges have to be tackled to deploy proactive future oriented ICT strategies.

Health care is a very particular institutional field, characterised by specific cultural, regulatory and cognitive characteristics, not to be compared with other markets. Moreover, the European policy has no direct impact on health care policy making as such. These policies are left to the autonomy on individual member states. These particular characteristics lead to a situation that a lot of ict-pilot initiatives on different dimensions of health care are launched, but that very little large scale implementation is being realised. On the other hand innovative theoretical and conceptual thinking is getting form on the supporting role of ICT in health care (ambient intelligence, active ageing,…), but ideas seem to have difficulties to fit with the "logic of reasoning and practice" within the health care field.

In health and health care some specific ICT challenges are rising For the near future specific debates need to take form on how to further deploy ICTs in a domain in which the role of the government is very crucial, that is not at all to be characterised by economic competitiveness and in which several public questions are main topics: particular examples are the issues of equity and access to health care services, augmenting the efficiency in health care, while maintaining high standards of care, development of health information systems and « health intelligence » for providers and governments. Moreover, particular future challenges do emerge when considering the specific health care system characteristics (and ICT infrastructures) in new member states. At this stage there is definitely a lack of debate (and policy perspectives) on how to manage the particular characteristics of the sector

ICT and the need to better understand the characteristics of the health care field

Health and health care is a particular application field for ICT. In particular, the domain is not characterised solely by economic competitiveness, but by specific procedures and traditions affecting the rules of conduct an organisational principles in which ICT policies are to be embedded. The health care field is particular is characterised by actors on providers and insurer side, that employ power strategies to protect valued interests, and they use implicit and explicit power to see that these interests are secured over time. Power is most apparent in the activities of those who construct the organisational field of health care: those who create the categories, the norms, the rules and standards used in the field. Based on a long lasting tradition actors within the health care field take them as given, as legitimate and as authoritative. However those who are not in particular acquainted with the rules, norms and expectations in the field tend to not understand the characteristics, but as a consequence hit particular barriers. The lack of particular knowledge about the health domain, impedes the opportunities and possibilities of innovating ICT strategies. Especially in the domain in e-health, more efforts should be made to understand the social characteristics of the domain. e-Health has so far been impeded by several factors such as the lack of broadband connections or an insufficient penetration of the Internet among the general public, but also on inherent conservatism within the sector about innovations and attempts to change professional practices. Urgently, the ICT technology push approach in health care should be complemented by demand-pull oriented policies. ICT policies within the health care field are not to be compared with ICT strategies in other competitive user markets. Although, a better understanding of the field will potentially lead to better developed and adapted business-model, allowing the development of competitive strength of ICT developers in this segment of the economic market.

The penetration of ICT within Europe an within individual member states is hampered by a lack of co-ordinated vision about the role ICT has to play in augmenting the efficacy, efficiency and innovation in health service delivery models. Health care delivery is expected to change in the future, within as well as over country boundaries. Having an impact on the provision of health care services, some particular questions are to be discussed, about new member states, and the equity in access of all European citizens to qualitative services. Major debates should take form on the future organisation of health delivery services, supporting ICT systems, funding and financing, about health information provision policies (including the development of context-sensitive information).

Development of a Regional Expertise Portal for the Island of Ireland

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Ireland, both north and south of the border, has undergone enormous changes in the past ten years. The South has experienced a period of unprecedented economic growth while north of the border the not insignificant "peace dividend" continues to present exciting possibilities for economic and social development. These changes have come with costs however. In the South, the traditional reliance on agriculture as the mainstay of the economy has diminished with the accompanying societal impacts. High technology industries such as the pharmachem, electronics and computer sectors have now supplanted agriculture as the main employers. In the North, the traditional focus on the textile and heavy manufacturing industries has been replaced by pharmaceutical and aerospace. Knowledge has become the new raw material driving the island's development.

Society now relies heavily on a highly skilled and educated workforce and Ireland has experienced a significant skills shortage in key sectors.[1] The third level educational establishments have responded by tailoring their programmes to meet these new demands. Notwithstanding this, highly educated and skilled people have become an important and scarce natural resource.

In today's society, accessing knowledge is as important as accessing mineral deposits was for previous generations. The third level sector is, of course, the traditional source of an educated workforce. However the third level sector has a dual role, it must satisfy the requirements of society, by producing the right number of graduates with the right knowledge and skills but it is also an "opinion former" and innovator. For the latter roles, it must facilitate and encourage the development of new ideas through scholarly research and debate.

The universities, along with their scholars and academics, have been rather poor at making their thoughts and expertise accessible to society. Indeed in English usage the word "academic" has become a pejorative term. However with the need for greater accountability for the investment of public moneys in both the institutions and the individual academics, academic output in the form of scholarly activity and applied research must be promoted the general public. This, coupled with a quantum change in the availability of information through on-line databases, has led to a very significant change in attitudes on the part of academics. For instance, information on published material and its impact is now readily available through independent Web based services. Previous sensitivities of academics to provide information on their research output and expertise have now diminished. It is now accepted that it is in the best interests of the academic community, the third level sector and society in general to assist in the process of disseminating information on the wealth of knowledge and expertise contained in our educational establishments.

In 1997 the universities in the Ireland developed compatible knowledge management systems to collect details of academic output. There are currently nine universities on the island of Ireland, two of which are in Northern Ireland. Dublin City University (DCU) acted as so-called "trail blazers" for the project, and designed and implemented a web-based system to collect information from its academic and research staff on a wide range of scholarly

[1] http://www.skillsireland.ie/press/reports/pdf/egfsn040906_research_skills_report.pdf

activities. This is known as the Research Support System (RSS) in DCU. Each member of staff can create a body of information on the RSS database, which is collectively known as their research profile. Procedures were established to validate the data, and policies put in place to encourage staff to regularly update their profiles.

Since its installation at DCU in 2000, a further ten universities and third level institutions on the island have installed similar systems, and work is underway to make these systems available to smaller third level institutions such as the institutes of technology. The next logical step was to examine how they could be used as an integrated unit in the form of a regional resource. The newly formed cross-border agency, Inter*Trade*Ireland, established under the terms of the Belfast Agreement, was quick to realise the potential benefit of a regional expertise database to the island's economy. A team of consultants confirmed that the demand for such a system existed among the business and commercial sector and also that the proposed model was technically feasible.

In the model, the expertise information is extracted, on a daily basis, from the knowledge management systems in the contributing institutions. This information is then presented on a portal web site to be known as expertiseireand.com. This approach ensures that the data are kept up-to-date and that any changes made by an individual to his/her profile on an institution's system is automatically reflected in the data contained in the portal's database. Holding the information in a central database on the portal server has the advantage of providing fast access when searched by visitors to the portal.

The portal was launched on the 1st July 2003 and can be accessed at www.expertiseireland.com. The Conference of Heads of Irish Universities, a not for profit organisation, owns the portal. The portal currently holds profile information on over 3,300 experts from ten institutions, representing over 50,000 publication details and over 30,000 conference presentations.

Visitors to the portal are provided with a number of mechanisms to identify the experts that best meet their needs. They can select a particular institution, faculty, and department to obtain information on the experts working there. Alternatively the visitor can search for occurrences of specific search terms in the profile of an expert. Results are presented on an institutional basis providing information on the geographical spread of expertise, and allowing the user to focus on experts in their locality. Visitors can register their interests on the portal and receive regular email updates if information matching their interests is posted on the portal. They can also make contact by email with experts they identify, or receive the contact details of an expert by email.

In addition to expert information, the portal also contains a database of funding opportunities to help the SME sector access suitable support for their business development initiatives. The portal also provides information on technology transfer opportunities.[2]

The success of any portal depends on the currency of the data supporting the portal's facilities. We believe that the model adopted in expertiseireland.com represents the most efficient and cost effective way of ensuring that the portal contains the highest quality and most up-to-date information on the island's expertise base without the need for problematic data collection.

[2] http://www.forfas.ie/publications/forfas050315a/forfas_050315a_from_research_to_marketplace_webopt.pdf

Exploring the Issues: Content and Process

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There is little doubt that over the next 10-20 years the World in general, and Europe in particular, will see many far reaching developments in the area of IST (Information Society Technologies).What will be the key social changes in Europe by 2020, driven by IST? What will be the social - and political - implications of these changes for individuals, organisations and society as a whole?

This brief paper explores these issues within the context of two particular technological developments that already exist today but, by 2020, are likely to have become widespread, even dominating many aspects of our lives. It is not arguing that these two developments are necessarily the most important IST changes, only that they are very likely to be important and, in addition, that they can be used to develop the framework for exploring the implications of other IST changes.

1. The development (and widespread use) of large integrated TV/Computer screens with extensive camcorder (i.e.: video) links.

By 2020, we will see the complete integration of TV and computer communication technologies. As a result, not only will there be the equivalent of almost an infinite number of TV channels, accessed via what we now know as computers, but that will enable the production of individually customised programming. Today the computer is still largely a word base communication medium; by 2020, through the widespread availability and use of cheap wireless based / broadband this will be visually, rather than word, dominated.

Some of the possible applications of this development:

a) It will enable families, or any group of people, to keep in touch anywhere in the world. For example, family members could share the direct holiday experience 'live' anywhere, from eating out in the South of France, to climbing Everest. ('Amateur' miniaturised digital video cameras would easily source this material although, of course, there would still be skill differences in the quality of the quality of the recordings, but a reasonable skill base in the use of the equipment would not be difficult to achieve.)

b) Any lecture given in an educational environment could be broadcast (live or recorded), via the internet based technology, to anyone, anywhere, in the world?

What are the potential implications of these changes:

- On the travel industry? (It could increase or decrease the demand for travel?)
- On the traditional TV industry? Current channels could easily virtually disappear?
- There will be much greater pressure for a 'one world' globalisation? The technology and content will be available globally. What will 'Europe' mean in this development, especially as it is possible that the 'European Community' could extend to over 30 countries by then. What role would be possible for Europe as a whole? How could any European role be implemented?
- What are the potential consequences for the traditional educational system?

- What will be the impact on the demand for film related products and the traditional cinema industry? As well as on the current direct mail industry for video/tape?
- What (new) controls might be needed, for example censorship; these could be much harder to be effective. What might be necessary and how could it be operated within the existing political structure, or would these need to change too – if so, how?
- What are the implications for the concept of individual privacy? Given the above development, it is important to explore potential implications in a systematic way, to identify whether there are some developments that we would like to encourage and conversely are there developments that we would like to discourage?

2. The development (and widespread use) interactive participation IST activities, from games to survey facilities.

Many similar issues to point (1) above, also arise from this example. The extensive use of interactive games/activities could result in the much more widespread involvement in interactive gambling. This could easily have profound social and cultural implications, including individuals seeing participation in such 'game' shows as a 'career'; it could easily encourage an obsession – if not addiction – to superficial materialism. Las Vegas instantly available to all. Will it result in an increasing division between those materially driven and those, in essence, morally/spiritually driven?

(Note: Other change drivers, applications and potential implications could be identified and explored using a 'brainstorming' session.)

The above developments need to be seen within the context of other changes (and their inter-relationship) taking place in society, such as: Globalisation, the Changing Role of Women, the Role of Religion, New Pressures on Democracy, the growing gap between the 'haves and have not's' (defined in material terms), possibly reinforcing the differences between those materialistically driven and those primarily driven by more spiritual agendas.

It is essential that we start by asking the right questions today about these developments, if we are going to have any chance that these changes will end up by having positive, rather than negative, effects. Which industries - and individuals - will benefit and which not? What are the implications for work and leisure? What are the expected trends? And what do we want to happen? Do we have the right processes in place in order to turn the answers into effective policies?

The main concern here is to ensure that there is a valid learning framework (using techniques such as identifying the 'drivers of change'; undertaking stakeholder analysis; developing scenarios; and the use of GLIMPSE analysis) for considering these issues and these developments are regularly reviewed within a climate that encourages effective learning. A thorough discussion of both content and process issues today is the only way we are likely to end up by producing a better world for us all.

(Note: "*Only if the effectiveness of our learning is greater than the amount of change taking place, will there be any chance that the changes can be equated with progress*.")

Nanotechnology for a European Knowledge Society?

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Atoms and molecules are the essential building blocks of all things. The manner in which things are "constructed" with these building blocks is vitally important to their properties and how they interact. Nanotechnology refers to the manipulation or self assembly of individual atoms, molecules, or molecular clusters into structures to create materials and devices with new or vastly different properties. Nanotechnology can develop new ways to manufacture things. Since the late 90`s, nanotechnology has shot into the limelight as a new field with tremendous promise. Experts have even compared the revolutionary aspects of nanotechnology to silicon and plastic and their impact on society and the wide range of new products, which arose from their use. This new, "small" way of manipulating materials has already led to new research areas and the development of new products, which are available on the commercial market.

Nanostructured materials play a key role in most of the nanotechnology based innovations. By tailoring the structure of materials at the nanoscale, it is possible to engineer novel materials that have entirely new properties. With only a reduction of size and no change in substance, fundamental characteristics such as electrical conductivity, colour, strength, and melting point – the properties we usually consider constant for a given material – can all change. Therefore nanomaterials show promising application potentials in a variety of industrial branches such as electronics, IT and medicine. Nanotechnology here holds the promise for producing better goods with less input of energy and /or materials, developing specific drug delivery systems and lab-on-a-chip based diagnostics for a minimal invasive medicine, improving information and communication through smaller and more powerful electronic devices etc. An optimistic view on these developments predicts that a new "industrial revolution" will take place in the following decades which could lead to a very competitive European knowledge society.

Por una prospectiva para entornos inestables, inciertos y altamente conflictivos: La experiencia del Programa Colombiano de Previsión Tecnológica e Industrial

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La elaboración de políticas y estrategias de Europa en IST puede aprender de las experiencias de América Latina. En la medida en que se profundiza la Sociedad de Conocimiento, múltiples interrelaciones e influencias inducen conflictos e inestabilidad. Es un espejismo esperar que hacia el 2020 en el mundo disminuya sustancialmente el nivel de conflicto. En cambio es realista aprender de continentes que ya viven en la vida cotidiana elevados niveles de inestabilidad, y crean estrategias para aprender a manejar el riesgo y la incertidumbre.

Dentro de un paradigma cartesiano enfocado en la predicción y el pronóstico (prediction-forecasting), es difícil comprender como pueden tomarse decisiones inteligentes en un contexto político caracterizado por: -Información fragmentaria, lenta, contradictoria. - Modalidades de decisión inmediatistas y administración de crisis inadecuada. - Presiones y restricciones coyunturales. - Insuficiencias de la educación científica. - Tendencia a la ideologización a expensas del análisis. Sin embargo, en América Latina ha surgido un nuevo enfoque denominado construcción de futuros, que permite aprender a convivir y actuar en medio de elevados niveles de conflicto e incoherencia de la acción colectiva.

Basado en el aporte de Escuelas cómo la Previsión Humana y social y la Planeación Estratégica Situacional, el nuevo enfoque prospectivo pone el acento en el fomento de procesos de construcción de futuros en lugar de limitarse a la observación de los cambios tecnológicos y sociales. Este enfoque implica que estructuras institucionales como los Programas Nacionales de Previsión (foresight) Tecnológica e Industrial deben enfocarse en procesos de despliegue y activación de las capacidades de cambio de la sociedad, la elaboración de visiones compartidas de futuro y la promoción de Agendas Regionales que construyan proyectos secto-territoriales.

En Colombia, Colciencias, la Corporación Andina de Fomento y el Ministerio de Comercio, Industria y Turismo han impulsado desde el año 2002 el Programa Nacional de Prospectiva Tecnológica e Industrial (PNP). De acuerdo con el enfoque de construcción de futuros, la misión definida para el Programa fue la de estimular e incentivar el desarrollo de capacidades nacionales en prospectiva tecnológica e industrial, así como generar aplicaciones y ejercicios concretos y exitosos a través de la construcción de una plataforma de generación e intercambio de conocimiento, experiencias y mejores prácticas en previsión, utilizando modernas técnicas de gestión del conocimiento y comunicación.

En el primer ciclo del Programa (2003-2004) los principales resultados obtenidos son la evaluación del estado del arte en prospectiva, el establecimiento de contactos internacionales, la realización de 10 ejercicios secto-territoriales y nacionales, la disponibilidad de metodologías on-line y software especializado, el desarrollo conceptual en temas tales como vigilancia tecnológica, prospectiva aplicada a cadenas productivas, prospectiva territorial; la producción de materiales pertinentes, y el apoyo a procesos institucionales de Colciencias, entre otros aspectos. En el nuevo ciclo del Programa (2005-2006) se pretende orientar las capacidades nacionales en prospectiva para el desarrollo de áreas estratégicas de la ciencia, la tecnología y innovación

aplicadas a la economía del conocimiento y la competitividad del sector productivo. Los objetivos específicos son:

- Contribuir a la construcción de una visión a largo plazo de la transformación productiva que requiere Colombia, a partir de la identificación de oportunidades y la sustentación de prioridades en áreas temáticas y/o sectores productivos de interés estratégico en los campos de ciencia, tecnología e innovación, para la consolidación de ventajas competitivas nacionales de primer orden en un contexto mundial.
- Profundizar el trabajo en las regiones, mediante ejercicios de construcción y/o fortalecimiento de cadenas, clusters y sistemas regionales de innovación.
- Fortalecer la capacidad de formación de formadores de primer nivel en prospectiva y vigilancia tecnológica, con base en la actuación de Universidades y Centros de Investigación y Desarrollo como agentes de cambio para multiplicar el radio de acción del Programa.

La experiencia colombiana ha suscitado un enorme interés en varios foros internacionales especializados. Como factores críticos de éxito en particular se destacan la aplicación y el desarrollo de diferentes enfoques y metodologías prospectivas, la disminución de la asimetría en capacidades prospectivas entre territorios con desiguales condiciones de partida, la incorporación de los resultados de los ejercicios en la toma de decisiones, basados en pactos sociales, consensos sociales y procesos que acumulan trabajos y experiencias prospectivas. El éxito del Programa en la práctica se debe al enfoque amplio para pensar y ejecutar la previsión (foresight). El punto principal es entender que en entornos inestables un Programa de Previsión debe ejecutar cuatro funciones básicas:

- Cognitiva: Comprender el proceso de desarrollo científico y tecnológico
- Proyectiva: Imaginar y desarrollar alternativas de cambio de la estructura productiva.
- Organizativa: Desarrollo de comunicación, confianza y sinergia de los actores sociales
- Educativa: Conciencia y entrenamiento progresivo de una masa crítica de personas especializadas.

No obstante, existen varios riesgos para el desarrollo del Programa. No existen “seguros” para garantizar el éxito de la experiencia. Una dinámica social positiva atrae efectos paradójicos. Por un lado demandan mayor capacidad de aprendizaje y recursos. Por otro lado los acumulados pueden perderse dentro de la misma inestabilidad institucional. Se han identificado seis limitaciones agrupadas en tres categorías que deben atacarse para sostener la dinámica:

- Contenido
  - Profundidad, dada por la infraestructura y apoyo de información y conocimiento
  - Soporte Profesional, dado por el acceso a nuevos métodos y capacidades de diseño.
- Proceso
  - Soporte Social, o el apoyo de redes sociales y de conocimiento
  - Sintonía de los actores regionales y sectoriales con la visión en proceso de construcción, dada por la articulación de trayectorias y la convergencia en procesos y proyectos científico-tecnológicos.
- Institucionales
  - Capacidades o incorporación y articulación de nuevos equipos de trabajo
  - Manejo de Agenda u organización de los flujos crecientes de trabajo.

En situaciones de riesgo, el intercambio de conocimiento es fundamental para acelerar el proceso de aprendizaje colectivo entre la experiencia colombiana y la experiencia de países latinoamericanos y europeos. Colombia tiene mucho que aprender del proceso de integración europea y su desarrollo institucional. A su vez, puede mostrar como se organiza en medio del conflicto y la inestabilidad para producir sentido, demostrar su relevancia y proyectarse hacia un mejor futuro.

Building up Europe´s largest industrial pole in semiconductors industry

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Scarcely any complex product today can manage without microelectronic components– they are often responsible for the crucial properties of the product. Memory and processor chips ensure that cars keep on track in an emergency stop. Full microelectronic components can be found in most technical appliances such as cameras, phones and, of course, computers, as well as medical equipment. Microelectronics today guarantees more convenience and safety in most technical areas and thus a higher standard of living. This technical development has spread to a wide extent as a result of incomparable reductions in the IC prices, with a simultaneous considerable increase in performance. Technical development is still growing dynamically. **The field of electronics has progressed into nano-electronics**, where even greater performance levels are expected from still smaller components.

It is all the more pleasing that support for research in recent years has made a major contribution to ensuring that Germany has once again become a competitive place for the production of microelectronics and a place for nano-electronic research with highly promising results. The fruits of this support policy, in harmony with the federal government and the EU, are evident to an impressive degree today in the **high-tech region of Dresden**. Global players such as Infineon, AMD, DuPont Photomask, Siltronic and more than 100 other companies, research institutes and subsidiaries of foreign equipment manufacturers have all been a part of turning Dresden into Europe's largest electronics centre.

Activities in the Dresden region alone have produced about 22,000 jobs with an extensively broad-based innovation effect for the whole German economy. For example, €143 million have been invested in research for 300 mm technology. In projects supported by the Federal Government, 44 partners from industry and state research institutes, including 21 SME companies, have developed the 300 mm standard and taken the lead at the cutting edge of a world-wide technological innovation. The general economic effect of promoting 300 mm technology has been investigated by the German Institute for Economic Research (DIW, 2002). According to their model calculation, state earnings already exceed the state funds invested here by 60%. And the success figures look even better when the effects flowing into the social security systems are also taken into consideration. So **the investment has paid off** for both the economy and for society at large.

The new Advanced Mask Technology Centre (AMTC) in Dresden constitutes a further stage in expanding Germany's role as a place for the electronics industry: It is Europe's first high-end research and production facility of its kind. One reason why American investors come to Europe is the attractive general conditions for research in Germany. The BMBF will continue to support research into mask technology and lithography throughout Germany. Twenty companies, including seven SME businesses and thirteen research institutes, are joining forces to investigate the future production technologies for nano-electronic components. The BMBF expects that this support for research and development will once again result in considerable benefit for Germany as a business location.

On Some Premises to a Worth-while Future E-Society
or
Retrognosis from a Long-Range Future

Peter H. Mettler

Foreword
What do we mean by "microelectronics"? We mean the grand total of all applications of microelectronics, chips, computers or other electronic devices, including robots, artificial intelligence and automated language translation, etc.. We much rather utilise the technical term microelectronics then e.g. information science because it is our firm belief that so far we only developed new tools, not yet (even the foundations for) a new society.

How will the Kondratieff cycles be continued? Our present one (the fifth) is the one of microelectronics as new basic technology and it is somewhere between 25 and 30 years old (though it all goes back to C.Babbage, 1840), whilst the sixth, based on micro-genetics (bio- and health-technologies) is already in the making (not without heavy involvement of microelectronics). It is our belief that this sixth one will end the 50 years rule of the theorem of Kondratieff, will last considerably longer, will be auto-generic and will topsy-turvy industrial societies. And it will provide them with sufficient resources to become totally independent from lesser developed countries, or, and in turn, there will then be the real danger that they will completely lose interest in them and leave them where they are or to their own destiny.

What is the guiding question in every analysis of "e", information or knowledge, etc.? Are industrialized societies characterized by a new content or just by new tools, instruments or technologies (even if they are basic ones)?

Present phenomenology, four selected examples:
O The latest gadget in e-commerce: whilst you fill out a form (e.g. for a command), a miniature camera in your pensile notes what you write as well as the pattern woven into the paper and orders directly;
O The latest technical break-through: superconductivity of plastics;
O Advances of intelligence beyond the imagination of the creator presently progresses along the lines "genetic algorithms and evolvable hardware" (without being able to give you details on them). In the "Technology Quarterly" of "The Economist" (issue 24/3/01) it even read like this: "Over the next few years, evolutionary machines could show humans the way".
O Microelectronics and the cost for their utilisation have developed into economy's biggest sector and will very likely continue to increase. It further stimulates and/or facilitates other business branches (and a lot of other and further functions) as well as quite a long series of problems, as e.g. the relativisation of the property-principle, as shows the possibility of free access to music.

So: There is a potential for a new society. But where will that new society be heading?

Future phenomenology, a look backwards from 2358 to today:
This is a scenario, from which we try to "backcast". Why did mankind develop all these technologies and tools? E.g.: Why did we try to go into space? Because we develop tools most often for other purposes, then we use them for other purposes and so it is done. Why did,

e.g., this US millionaire want to go into orbit? Because it was possible in general and also for him. So he did.

Setting: 2358, in a spacecraft:
"Bahija had her eyes closed and cried out loud, her mutation and neurotransmitter machines still on. Jak (Jim-Ashok-Keiji) comforted and caressed the young lady already since twenty minutes, talked to her patiently and tried to find out what's on, because he couldn't understand one single word of what she was stuttering. The longer the more he got very nervous and almost lost his temper when she finally opened her eyes. But then it took her another twenty minutes till she re-recognized her present life-companion and he also knew that she did.

Then she first tried to regain conscience on what had happened to her and then to explain her experience to him and make him understand.

Finally she recognized that she would not be able to make him understand until he himself would have returned from similar trips after having been enabled to go on them.

Biographies:
Bahija, born 2251 by a Maghrebian mother who had won a once-in-a-decade price, consisting of an all-comprising e-training and who was invited to immigrate to the TAU (Trans-Atlantic-Union), thus being a member of the permanent brain-drain from the outer world into the centre. Her mother wanted her when she was 60 (that's why I called her "young") but did not want to clone herself. So mother's pregnancy started teleported. After Bahija was born, she was immediately sent to e-school, where they implanted the mutation as well as the neuro transmitter machines into her brain. It took her almost her whole youth (i.e. almost a hundred years, out of the three hundred years average life-expectancy) to learn to know and to handle these machines. And now she is training to teleport herself into the future ... as one out of millions ...

Jak, born 2280 in Madras by an Indian mother (who had a British father) and a Japanese father , i.e. he is 30 years younger then Bahija). He was a slow developer, but then gained all imaginable prizes, first Indian and then others, and now is a first generation immigrant. He was picked by Bahija, who is still influenced by some ideals of her mother and wanted a classical handsome man, whilst most men around her had already adapted to the ideal of being small, almost without muscles, but with super-brains ... and thanks to her, he now feels that he might make it one day: understanding the present time in this world beyond what he had known before ...

The two phenomenologies differ in as far as the present one only describes tools whilst the future one describes different and deeper problems:

Let us first contemplate on present driving forces into the future: Alternative forms of communication, entertainment and adventures, business and private life, travel and homes, in short: the future civilisation in comparison with the one of today as well as with those traits already visible or in the pipelines of industry and the public relations agencies. They could also be characterized as follows:

The society at large is super-controlled by devices or systems resembling our present GPS, covering public places via nano-cameras, over think-bugs along the line of present web-bugs right down the line to toys for babies which contain controlling devices of various sorts

(multi-media), and robots all over the place, some of them already quite independent and equipped with almost-feelings, multi-linguistic and quite handy.
The following five technological "revolutions" brought it about (not taking about "converging technologies"):

- Hydrogen-based energy systems;
- Super-conductivity of many materials;
- Gen-technology;
- Information-science and -technology, including mass-media, etc.;
- Nano-Tech.

The utopian story teaches us, on the other hand, two things:

- the old Indian slogan is still true: you can't judge anyone in whose moccasins you haven't walked. Or: Lack of common experience hinders understanding. That's already a most wide-spread case today, particularly between DCs and ICs; and
- the story clearly demonstrates, that we should not only speak about the famous intelligent coffee cup, which could tell us if our coffee is still too hot, if it already contains our preferred quantum of milk and sugar or not or to what degree, if we reached our digestible quantum of coffee for today already, etc. …

Microelectronics or just "e" simply means electronic, i.e. something technical and therefore neutral. "e" is prevailing today, because no one dares to decide between information- and knowledge-society. We don't know, what and how an e-society would be, and in particular not, what and how a future e-society would be. Because we don't, we can freely assume features of such a society and imagine premises to it. Here are two first ones:

Premise 1:
Every new society has got to be truly **world-wide**. But we know that this will not be true for a very long time, as shows the already quite old and technically much more simple telephone. Shouldn't we start nevertheless? Of course, we should. But we should never forget our task. And reality really is brutal: The job- and unemployment situation has, viewed from a different ankle, as a result the global digital divide, i.e. the growing gap between wealthy and poor countries.

Premise 2:
"**Worth-while**" means: Do you get something for the price you paid, which you evaluate as worth-while, which you would not want to miss after you got it? Now, and as an example: what's the advantage, when you have the possibility to call someone really far away, say in Australia? That depends on what you want to communicate. Sometimes or even often it would be much more "worth-while" to just and simply talk to your husband/wife, parents or children … but long-distance, and that you will not see the other person so soon … is much more "sexy" or reputable.

A second gap is the one between the symbolic (the virtual) and the real (reality). It started in marketing or with brands and the people possessing items with brand symbols on them were given the feeling of importance and that they belong to the important ones, to the inner circle. But the longer the more the fooled ones realized that they have been fooled. Now we have the hype of "debranding".

In the following I will just mention two further developments which could be called between possible and likely and with time horizons between 10 and 30 years from now, as every serious journal on or of the future (or an futures research) would report, be it The FUTURIST from the US, FUTURIBLES from France, ZUKUNFTSFORSCHUNG from Switzerland,

ZUKÜNFTE from Germany, FUTURES from GB, or the Journal of Futures Studies from Taiwan, etc.:

O In view of "information warfare" (electronic Pear Harbour), the military would probably immediately raise their hands and claim responsibility (but competence as well?). But security should never be let in the hands of the military alone and aggression by cyber-terrorists (or Internet-terrorists) is not always targeted at states but also at companies, associations or individuals, in short, against the civil society. Economic and/or industrial espionage is one example, individual psyche problems and outlets like revenge is another, and religious-political motivations like the Japanese Aum or the Chinese Falun Gong sects a third and many more could be cited. They all could try to use micro-electronic skills in order to pursue their goals, they all could aggress waterworks as well as air-traffic installations or tap singular computers, etc.

O In the same way as TV watching seems to have gone beyond its culmination point (how many people watch how man hours per day) because of interactive possibilities, the INTERNET boom might come to an end soon. - Should we really continue to talk about the INTERNET, even if we mean Internet II or broadband, etc.? Shouldn't we call it **EVERNET**? Because it could be a very handy tool ready all times and everywhere for a thousand services on verbal command? And it was just in view of this development that Thomas P.M. Barnett from the US Naval Institute recently proposed to create a Department of Network Security with the task to secure this EVERNET, which just began to be visible on the horizon …

Conclusion and two more premises

All new technologies are but tools. We can use them in the same time for better production, industry, traffic or consumption as well as for the organisation of our lives. But the content of our lives should never be technologies alone (nor money or wealth, nor power and influence, speed or leisure or the reduction of cost, etc.), but e.g. friends as well as discoveries or the removal of frontiers.

The new economy (and here I don't just mean new markets for start ups, mainly from the dot.com industries) is still the old, if one looks more profoundly into the matter. It is still capitalism, even with a trend back to imperialism and manchesterism. Even the very speculative theories of the de-liking between capital and production (or the other parts of the economy) revealed erroneous. Let me show you that with the example of the e-stock exchange, if you allow me to call it that way: the easier and cheaper it is to place orders personally and directly through ones own computer, the more the customer has to rely on information and analyses, or on "analysts". But there are only very few really independent analysts. "Standard & Poor" and others, who have made analysis their business, still have to sell their analyses. They can only sell "critical quality", otherwise nobody would buy it from them. A broker takes a percentage from the order-sum, but finds himself in a conflicting situation if he is also active in the M&A business or in investment-banking, as most are. Normally, an analyst works for a business firm and has to sell for her. And the more people realize these days that they got false advice, they go to court and get indemnification from the analyst's firm. And it becomes more and more clear and public: the analysts' firms often possesses stocks of companies they praise into heaven themselves, sometimes up to 40 or more times its real value - and with full consciousness, because then they can sell first and realize enormous gains. If that isn't criminal …

Which areas have to be considered as important in the future e-society?

1. Changing nature of work
2. Changing nature of business

3. Organisational change
4. Social exclusion
5. Reconstruction of government
6. Health and medicare but also selling of drugs (after self-medication) as well as remote therapy
7. Collective Intelligence

I will elaborate in the following only on the three last one

Reconstruction of the governmental system
We will have various, at least four, parliaments on both levels, world-wide or globally as well as regionally; or bloc-wise, with the assumption, that, from 2040 (or so) on and at least for several decades to up to a century, the globe will have the following five blocs: China, India, the Muslim bloc, South-East Asia under Japanese hegemony and the Transatlantic Union (from Cape Horn to Alaska and from Capetown to Vladivostok). If we consider it possible that politics continue to be a pyramid (bottom up) and if we just elaborate on the political level, the five blocs will eventually still meet in the UN, though fundamentally reorganized:

- Big agglomerations / mega poles
- Industry / economy
- NGOs
- Politics.

From that we delineate:

Premise 3:
Only if all these entities and/or world-players have agreed on non-military settlements of controversies and that means e.g. permanent confidence-building e-communication, **the globe will avoid a military doomsday.**

Health and medicare, selling of drugs (after self-medication) and remote therapy, etc.
Potential e-societies structurally are nothing different then what's going on already, e.g. of the combination of health-discs and e-medication: However the device's name will finally be - "smart-card" had recently been proposed - it would have the advantage to be "portable" (but would require standardized reading-devices). An alternative proposal wants to store case- and disease-management via the Internet and offers a complementary smart-card for access, so that everyone can determine who gets access to which data of his personal data-set. And then, an implanted intelligent drug-delivery apparatus with a biosensor would respond e.g. to internal changes in the body's chemistry and behaviour, thus freeing patients from complicated regimes and making the entire system autonomous, e.g. from external climate changes when travelling.

Collective intelligence
Even if heavy doubts remain if it will ever be possible to automatically translate every of those 600 or so major languages spoken on the globe into every other one (dialects non included) and not loosing too much of its content (and culture), progress with translation machines will come about. And automatic translation surely belongs to the globe's **collective intelligence**. But much more is at steak: the mentioned "global digital divide" will develop into an "intelligence and access divide" (my scenario at the beginning), because people will have access to data-bancs by mere mental decision to do so (via implanted devices like the mentioned neurotransmitter) and thus have exponentially better memories and knowledge, not talking about what still sounds utopian: capacities to read each others mind. And if we then consider two more possibilities:

- people grow older up to 300 years;
- brains can be preserved and/or transmitted or implanted in newly born ones,
- we have to consent to

Premise 4:
The ever-increasing utilisation of ever new and more powerful tools changes our historic experience: We will not only create a new homo sapience but also a new society. Very little can be said on them so far. But the more necessary it seems today that we develop ethical guidelines for the coming blend of “e”, “i” and “k”. And it seems certain to me that the sixth Kondratieff cycle, which is the blend between micro-electronics and micro-genetics, will last much longer than the roughly fifty years of the previous cycles.

The End of the Internet Rush

Theodore Modis[*]

ABSTRACT

The concept of natural growth in competition is being exploited to produce forecasts for the use of Internet worldwide. Population trends and Internet-user trends indicate that the percentage of the population using the Internet is slowing down everywhere despite large discrepancies: 68% in the US, 45% in Europe, and 8% in the rest of the world. Whereas new growth phases with slow rates of growth should reasonably be expected from the third world, the boom years of Internet explosion are over.

Natural growth, otherwise referred to as organic growth, is typically evidenced by the S-shaped pattern followed in the evolution of a species population. The law of natural growth can be invoked whenever there is growth in competition, for example rabbits filling an ecological niche in nature (a grass range). Forecasts based on such natural-growth processes benefit from the reliability ingrained in the natural law of competition. The better the agreement between the historical data and the S-shaped natural-growth pattern the more confident we can be that our forecast is reliable. There have been many successful forecast based on this approach.[1]

The world population has been following such an S-shaped growth pattern, see Figure 1. The agreement between the theoretical curve and the data points over the entire 20th century is so good that it leaves little doubt about the forecasted trend.

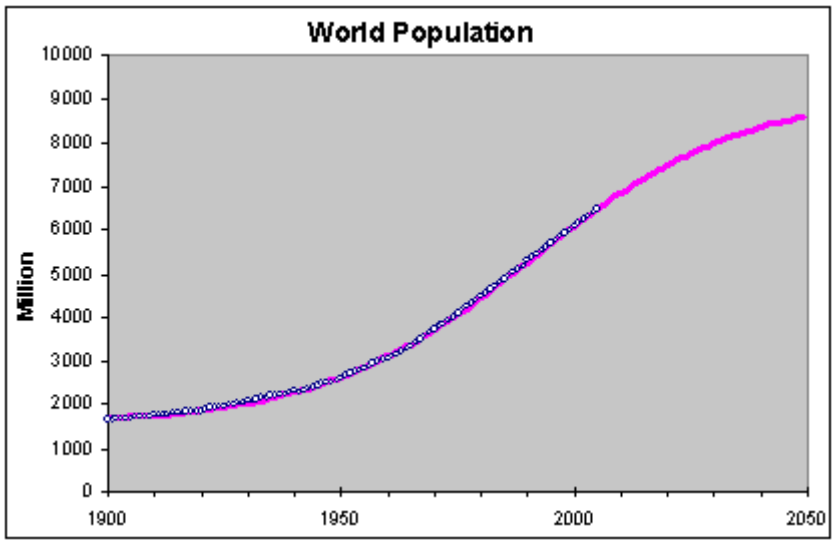

Figure 1. A natural-growth curve fitted on yearly data points on world population.

Data on the number of Internet users, however, are less readily available. A number of data sources have been consulted for compiling a set as complete and as reliable as possible.[2]

The data and the best-fit natural-growth curve are shown in Figure 2. The agreement is not as good as in Figure 1 and a new growth phase cannot be excluded in the future, after all S-curve are known to cascade as new niches open up.[3]

An S-curve fit on the data up to 2002 would have resulted in a lower final ceiling. Similarly, a future "deviation" of the data pattern may yield an even higher ceiling for the S-curve. Nevertheless the forecast in Figure 2 should be reliable for a few years.

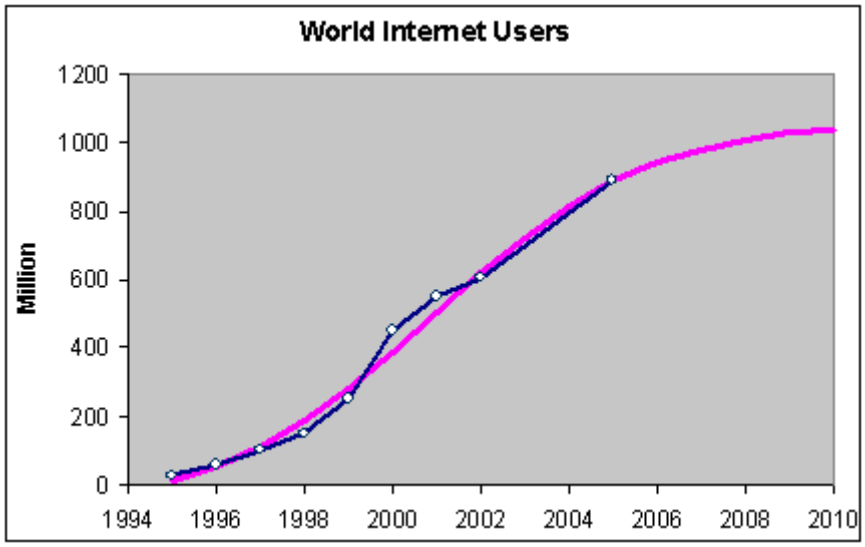

Figure 2. Data and S-curve fit on the worldwide number of Internet users.

Figures 1 and 2 together imply a ceiling of 14% for the world users of Internet as a percentage of the world population, a discouragingly low figure. This, however, is the situation during the first decade of the 21st century. Of course, there are large geographical differences with North America leading and the European Union (E.U.) following closely.

The evolution of the population of the E.U. is shown in Figure 3 below. The S-curve that best describes the data practically reaches a ceiling of 530 million people by 2020.

It is not surprising that growth of the E.U. population drops to zero in a few decades as many western European countries already have shrinking fertility rates. More surprising is that the completion of the E.U. population growth process is presently 85% completed and that between now and 2020 there is only about 80 million more people to be added. These numbers can barely accommodate the adhesion to the E.U. of the remaining European countries possibly including Switzerland. However, the adhesion of Turkey or other large such country seems to be excluded. This result is corroborated by the evolution of the surface area of the E.U., a growth process not shown here but also a natural-growth process completed to the level of 81%.

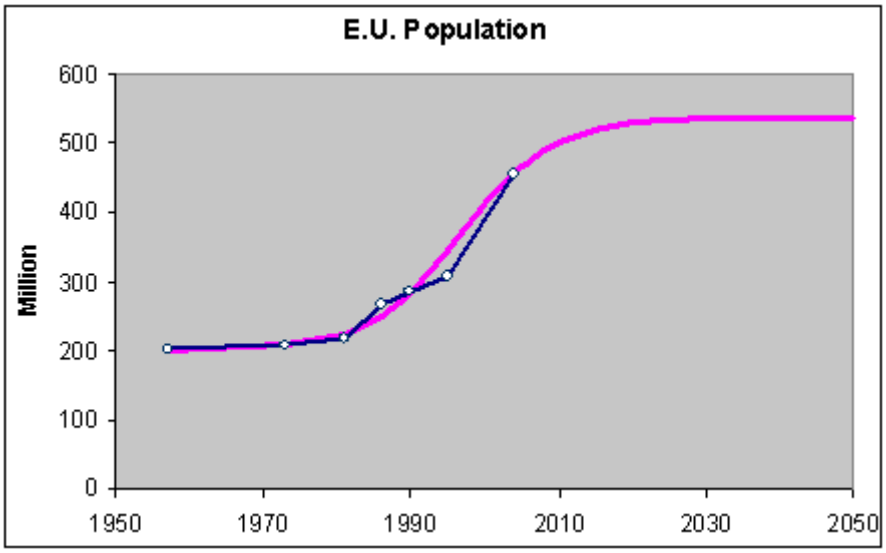

Figure 3. Data and S-curve fit for the evolution of the population of the E.U.

The evolution of Internet users in the E.U. is shown in Figure 4 below. The best-fit corresponding S-curve points to a ceiling of 253 million to be achieved around 2020. This brings the number of E.U. Internet users to 48% of its population, not far from today's 45%.

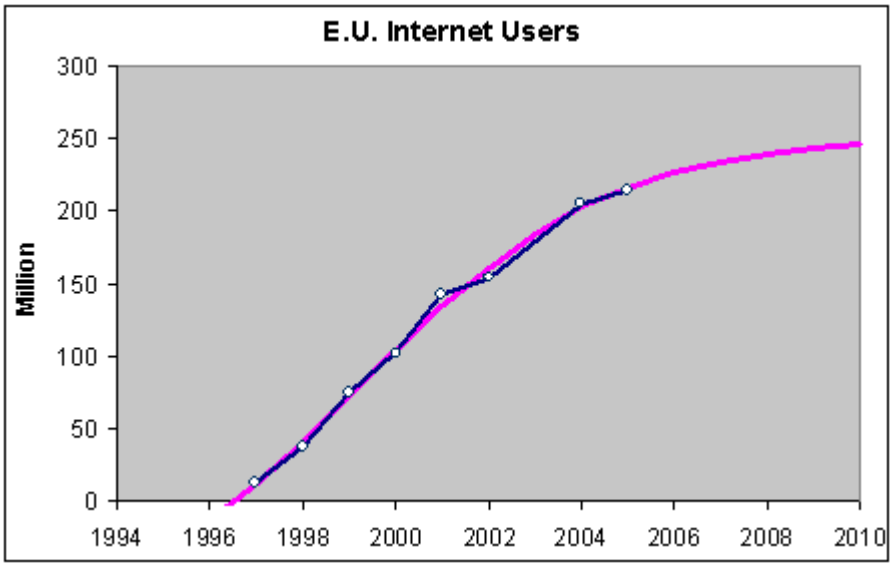

Figure 4. The number of E.U. Internet users and the best-fit natural-growth curve.

A similar analysis of the USA data leads to comparable results. It is estimated that the ceiling of US Internet users has already been reached today with around 200 million people, i.e. 68% of the US population.

Having obtained growth curves for populations and Internet users of the world, the E.U. and the US, we can now calculate the Internet penetration for the part of the world outside the E.U. and the US. This part of the world includes developed countries like Japan, Australia, Hong Kong, and Russia, but is dominated by the masses of people with no access

to Internet in Asia and Africa. The result as percentage of the population is shown in Figure 5. The final ceiling of the growth process describing Internet users is at 9% of the population.

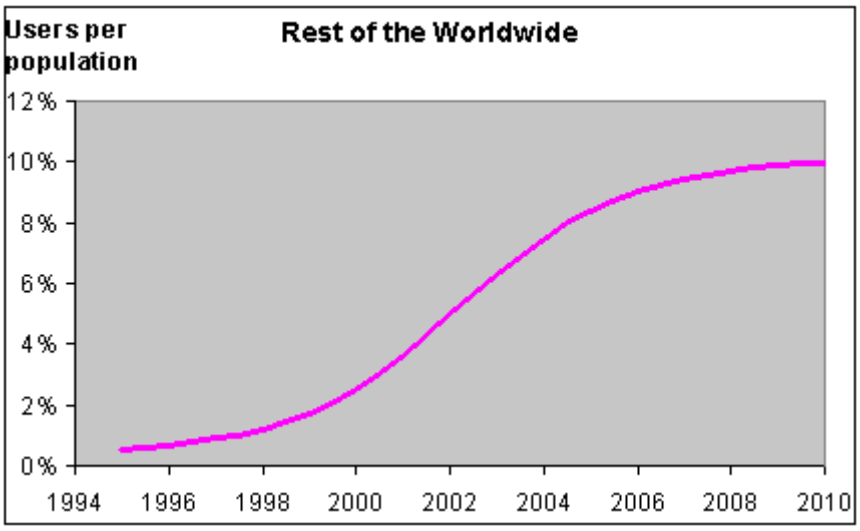

Figure 5. A calculation of the evolution of the number of Internet users in the world outside the E.U. and the US.

CONCLUSIONS

Natural-growth-process fits to the data imply that the percentage of the population using the Internet will not grow much in the coming years. In the US a ceiling of 68% of the population has already been reached, and the E.U. we expect to rise from toady's 45% to 48% by the mid 2010s. In the rest of the world today's 8% will only grow to 9% in ten years.

It would be unreasonable to expect the percentage of the rest of the world to remain at this low level forever. Contrary to the US and the E.U. one can be certain that there will be in the future a significant amount of growth in the number of users in the rest of the world.

One may infer, however, that the boom we have been witnessing in Internet expansion is over. Countries that were ready for it (such as US and E.U.) have practically filled their niches whereas countries that were not ready for it (such as China and African countries) need much preparatory work and will therefore grow slowly.

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Internet World Stats (http://www.internetworldstats.com/stats.htm)
ClickZ Networks (http://www.clickz.com/); and
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ICT Trends and CEE Boosters

[Proposal based on projects for ICT "visions" and IT STAR activities]

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It is taken for granted that:

- Europe will continue to expand in geographical, economic, cultural and political terms
- Europeans will grow wiser, older and richer

These developments will foster:

- the growing role of R&D and ISTs
- greater workforce mobility
- more time and money for education, health and entertainment

Technologies will adapt and in many cases guide these trends.

... Software is King

If we accept that embedded software complexity doubles every 10 months (as compared to Moore's Law for the exponential growth of transistors per integrated circuit) we could assert that the main challenge in future ICT developments are applications. IT is a domain of material quantity whose drivers are more output (capacity and speed), lower input (mass, energy consumption) and lower production costs. Information science (software development) provides the "intellectual" connection between man and machine. Software drives IT and supports the infrastructure components in all the e-related societal applications. Information scientists will continue being in high demand to conceptualize new models, define requirements and develop appropriate software.

...Industry will go Green

The industrial enterprise of the 21st century would not only have to be competitive but would need to become more socially responsible and helpful in sustaining a well-qualified workforce. Stronger partnerships with government, academia and community institutions will be developed. Processes will more fully depend on a synchronized product creation via virtual products, process and enterprise modeling and a better synergy of the various technologies from the design phase to planning and manufacturing (including production, quality control, delivery and customer feedback).

... a new ERA will Dawn on Man

With increasing productivity and incomes and decreasing production time, there is a need to diversify the population's out-of-work activities. The most evident areas are education, health care and entertainment. Lifelong Learning will remain a key priority but the methods, applications and trends in e-Learning will evolve. The role of the mobile phone as an educational tool will grow. As the "Nintendo" generation becomes older the infotainment field (including sports) with have a growing impact on education, the economy and recreation. An aging welfare society will demand new methods and strategies for keeping the population in a healthy and active state.

CEE: A New Powerhouse?

CEE is a direction and a source for European developments. In many of the defining European societal and IST developments the region has much to offer in terms of education, research, industrial production, recreation … On top of that, the present conjuncture is right for stronger synergies on a pan-European basis.

If we take the automotive industry (a major user of ICT products) for example, we will observe that leading car makers - VW, Audi, FIAT, Opel, Peugeot, Renault, Citroen, Toyota, Chevrolet, Suzuki - already have major production facilities in the region. This is also true of other sectors of the economy.

The CEE Information Society indicators are currently in average lower than those in Western Europe but the region has a significant R&D potential and these indicators will improve as the economies in the region continue to outgrow the EU-15 pace. With a more active participation in the EU programs and the reestablishment of horizontal links within the region the competitive edge of CEE is likely to strengthen.

IT STAR's Role as a Conduit

IT STAR is a newly constituted non-governmental, non-profit regional Association with a mission to be the leading Information and Communication Technology organization in Central, Eastern and Southern Europe. Its member societies are leading national profession computer organizations and its basic aims are to:

- promote ICTs and their applications in Central, Eastern and Southern Europe;
- encourage activities in education, research, development and application of ICT and disseminate information and results internationally;
- advance regional and international cooperation in the field;

The Association's activities include the organization of specific ICT related projects, conduct of studies and consultations, organization of international events and publications and establishment of relations with other international organizations.

IT STAR has already demonstrated a notable potential as a conduit to the CEE ICT community. Recently, in partnership with FISTERA it organized a workshop on "ICT and the Eastern European Dimension".

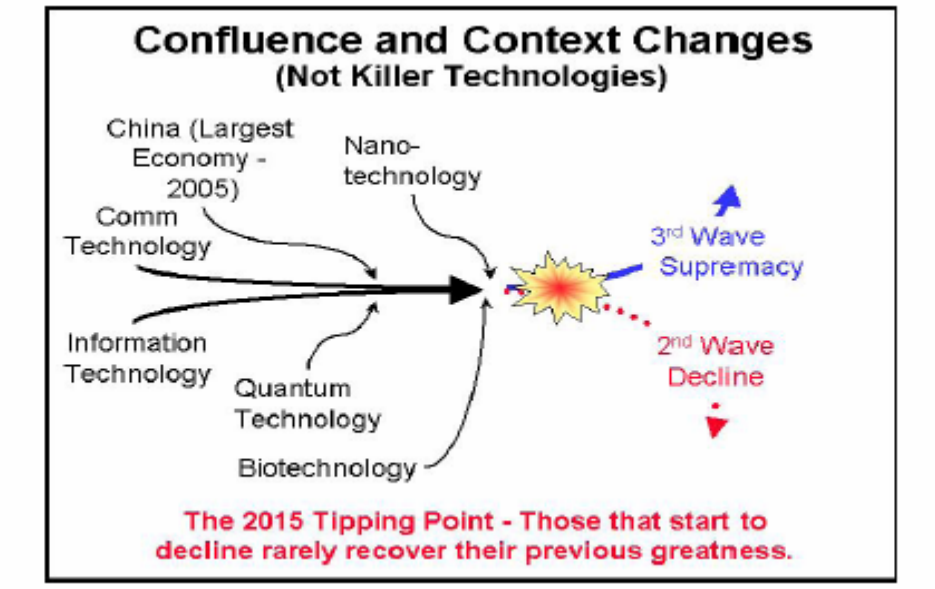
The Association is currently working on the preparations of a project for an ICT pool of experts. The concept will be grounded on a set of rules and procedures and will function on the basis of integrated national databases of ICT professionals, standardized systems for certification, collection and use of data on ICT professionals. The international component of the system is of prime importance with established procedures for processing national and international requests for ICT teams and individuals for specific projects, as well as a central point serving as a clearing-house and the virtual database "Keeper".

This IT STAR project would hopefully lead to products and partnerships for a more diversified utilization of the existing ICT potential of the Region at the Service of a Changing Europe.

2020: New Science, New Technologies and the Re-shaping of Society - 'One Uniquely American Perspective'

John Peterson

CONTEXT:
Just beyond the nexus of the second and third Tofflerian waves is a strategic inflection point where Newtonian physics meets quantum realities. New 'Science' and new technologies will reshape human 'progress.' Metcalf's law (connectivity) and Reed's law (information access and convergence) will predominate. Also of particular import will be new energy sources (hydrogen, anti-positron and zero-point), bioinformatics and biomimetrics. Exploitation and manipulation of molecular genetics enabled by nanotechnology and quantum processing will change evolution. The Grover algorithm will reduce the computational requirements for elaborate attempts at DNA sequencing. Cross-species molecular breeding and augmented biological (including human) capabilities will result. These will be paralleled by machine calculations and neuroinformatics with processing speeds on the order of 20-30 million billion calculations per second. Behavior modeling will offer near real time predictive values as communicating full-spectrum micro-sensors feed new information architectures, data repositories, and simulations. Nano-enabled robotic technology will begin to redefine human roles and social intercourse (social software, tele-presence, virtual contact, and many-to-many communications).



The timing of new 'Science' discoveries and resultant technology diffusion rates are significant unknowns. In the United States (US), the current generation of decision makers has been shaped by the recent past and is sustained by what was the 'then' usual. Reflected are an economic 'shake-out' and a decade of miserly restraint in funding new technology systems and fundamental and applied 'Research.' Most investment has been limited to incremental technologies that perform traditional tasks both faster and cheaper. Demand for new technology systems is pent-up, but managers are trained to cut budgets, not invest for future returns. This becomes problematic. Those still using 1990's information approaches will not be competitive by 2015.

SOME IMPORTANT VECTORS IN INFORMATION TECHNOLOGY:

While primarily aimed at dynamic situational awareness (i.e., communications, education, entertainment, etc.) information technologies will find widespread use in government and the military as well as in science and engineering. The end game for users will be the creation of the means for timely access to accurate but inexpensive information. Its differentiating value will reside less in its existence and more in its veracity, integration, analysis, and communication. Macro drivers will include:

- Tele-everything (from tele-presence to tele-medicine to tele-education) incorporating the communication of near real time information from multiple sources/sensors between and amongst multiple users. Included will be new dynamic 100 terabit/sec network architectures with very low latency and distributed intelligent operating systems (capable of automatic redistribution of machine intelligence functions to optimally adapt to new conditions and requirements.) Also included will be system generated symbolic manipulation for 'traditional' and 'quantum' programming and for systems superiority (100% functional predictability; high confidence > 99%; high reliability ~ 100%; immunity < 1 error in 1012).
- Persistent monitoring/surveillance will be augmented by coherent change detection including computer-aided design and computer-aided manufacturing (i.e., of microcircuits with submicron feature sizes, using tools for dimensional inspection, measuring and control systems.) Processes would support virtual prototyping, data visualization, visually coupled systems integration, and virtual reality, including all the elements of sophisticated modeling and simulation. Similar capabilities will be reflected in functional activities and find application in service sectors (government, public safety, healthcare, etc.).
- Information fusion will include autonomous data organization, analysis, filtering, and prioritization of 'findings.' Processing technologies, including computers, digital signal processors and array/vector processors with composite theoretical performance (including real time characterization of dynamic scenes, texturing, etc.) will inter-work to integrate information; and relate it to achievement of objectives/learning. By 2010 high-performance computing will be roughly equivalent to one human mind. By 2030 it will be the equivalent of a whole town and be available on a personal computer.
- Information access (massive amounts of archival ('life in bits') and near real time information) by all with a 'need.' This includes virtual immersion, i.e., dynamic scene generation algorithms; feedback algorithms; smoothing algorithms for variable resolution, orientation stereo and holographic displays including data visualization and direct access to 'alternate' brain portals.
- Information modeling including large complex systems modeling and simulations such as real time full spectrum sensor monitoring and performance prediction, macroeconomic (regions and nations), climatologic and terraforming, weather prediction, oceanographic modeling, accurate traffic, congestion and transport predictions, resource prioritization, allocation and delivery, etc.
- Information security and encryption including quantum using Shor's algorithm, and digital signature techniques to ensure veracity of artificial intelligence functions, intrusion detection, and countering.

SUMMARY:

In the emergent interdependent global economy, US trained managers are ill prepared to take advantage of the coming changes. Additionally, US workers are ill equipped by their public educations to understand, leverage, and maintain the capabilities inherent in a new, complex, and technologically grounded infrastructure. The new challenge, i.e., the ability to create

transnational value, will not be to deal with either new killer technologies or constrained access to resources, but to quickly understand new contexts (including new 'Science'), foster new ideas, model new concepts, and commercialize new solutions. At the nexuses of dramatic changes in context and new information technologies will be:

- The slide of the United States from superpower to same as any other nation [Indicators include $300 billion trade deficits; ratio of GDP to Research (32 other nations outspend the US); failure of the K-12 US education system and resultant disparate technical and computational abilities inherent in the US workforce (i.e., in Program for International Student Assessment (PISA) problem solving and mathematics literacy assessments, US students ranked 24th out of 29 industrialized nations)]
- A new age of science generating technologies incorporating bio, nano, and quantum realities. Among the gating factors will be the abilities of decision-makers to recognize and leverage the resultant capabilities. New technologies will translate into ubiquity of ability and competitiveness. Critical differentiators become information access (observation), interpretation (orientation), business model (decision), and execution (action) [i.e., Boyd's OODA loop; Warman's approach to information architectures; the Meder data ontology]. Success will come to those first able to gather, assess and exploit vulnerabilities in competitors' decision cycles.
- Shifts in defense spending to defend against 'non-explosive' strategies of social disruption (behavior) as opposed to large-scale destruction of resources (capabilities). Existent 'national' information gathering technical means will 'go black' as inexpensive and ubiquitous quantum encryption and additional non-electro-magnetic spectrum signaling (i.e., quantum objects) become available. Related venues include quantum everything (imaging, optics, holography, nucleonics, teleportation, etc).
- Global moral ambiguity concerning human experimentation will see the introduction of the first augmented biologicals, including humans, and a 'forever change' in not only evolution but the role of mankind as technological solutions, including robotics and adaptive artificial intelligence, play catch-up.

To the extent the US fails to regain technical impetus, the lack of critical skills and infrastructures will accelerate its technological and economic decline. The world is approaching a tipping point and is about to change forever. If the tenets of western society are to continue to thrive, it may well be incumbent upon Europe to assume the leadership role. It is indeed a brave new world that we are about to face!

What type of applications will European citizens demand? e-Care: IST serving the needs of citizens in an ageing society

Juan Reig[1], Rafael Lamas[2] and Jose L. Monteagudo[3]

Health is an absolute priority for European citizens and it is very likely to be maintained as a priority in the future[4]. Significant increases in life expectancy, a growing elderly population, advances in medicine, ICT revolution, and socio-economic policies are setting the stage for long term health and social care challenges globally and in the in the European Union. Furthermore, the family and social models where the care is delivered is also changing rapidly in our society.

The main drivers for the new needs and citizen's demands can be summarized, among them: comfort, convenience, co responsibility, customer satisfaction, continuity of care, services in-situ, mobility, and quality of life expectation.

Because of life enlargement, the number of adults with disabilities and chronic illness will dramatically grow. This is producing overall concern about the health and social care demands of a growing elderly population over the next few decades. These changes require rethinking health sector policy and health care services provision models since a disease-specific approach, alone, is no longer appropriate. In this line, it is agreed on the convenience to shift care paradigm promoting healthy lifestyles, the early detection of disease, and the maintenance and management of chronic conditions aiming to achieve higher quality of life and containment of healthcare costs.

The current medical care model will presumably evolve into a social-ecological paradigm integrating environmental and population health concepts. Revolutionary genomic and stem cell research will open new frontiers of prospective medicine and pharmaceutical engineering that will fundamentally transform current healthcare paradigms. New thinking about palliative care, terminal care and passive euthanasia will likely emerge. Although conventional ethical perspectives currently back at these important developments, they will become the foundation of the new order of tomorrow's social care system[5].

Concepts such as "independent life" and "aging in place" are in the center of innovative visions. The aim is enabling seniors to age in place in their common home environment, maintain their independence, and defer more costly care in emergency rooms and institutional settings for as long as possible. In the same line, preventive proactive health care approaches are gaining base thus putting attention on. elderly or handicapped persons but on healthy population also.

[1] Consultores Euroamericanos Asociados
[2] Fundación Vodafone Spain
[3] Instituto de Salud Carlos III. Ministry of Health. Spain
[4] D.Byrne, "Enabling Good Health for all. A reflection process for a new EU Health Strategy". EC 2004. http://europa.eu.int/comm/health/ph_overview/strategy/health_strategy_en.htm
[5] Denis H.J. Caro,"Toward 2025: Diagnoses and Prognoses for Canada's Healthcare System" Healthcare Management Forum. Volume 15, no. 4. Winter 2002, page 22.

New integrative visions for e-Care services have been proposed as a suitable and comprehensive approach able to cope with the needs of coordinating social, personal, and health care needs[6].

It is foreseen home care will grow in volume and extend in scope because IST enabling new possibilities for supporting improved care services allowing safer independent living and greater social inclusion. Personal monitoring and telecare concepts are converging with smart home, networked home and home automation approaches. Designers, architects, social and health care providers are working to improve daily living environments to help seniors for independence and comfortable stay in their homes. Focus is on the vulnerable and the chronically ill but also the active healthy. The basic guiding principle is that person-centric health management support can be possible if appropriate data is measured and use each person as their own baseline, meshing these data with epidemiological data for improved decision making. Prevention and early detection are the aim of this type of ICT applications. Interest is growing in having easy to use, home based proactive health and social care support, capable of assisting in early detection of citizens problems, and support proactive efforts by the user to keep healthy.

A recent report on "ICT and Disability: Proposals for the Future"[7], coordinated by the authors and involving a set of representative experts and user associations, has analysed the role of IST regarding accessibility and dependence issues. The study has identified a number of strategic action lines and potential projects to exploit the capabilities of technology addressing practical applications for emerging needs in our society.

It must be noted that advances on biomedical instrumentation, sensors, mobile computing and wireless communications technologies are supporting the vision of pervasive, ubiquitous and context aware information systems supporting home health and social services provision. Research projects dealing with wearable systems, smart homes and ambient intelligence (AmI) developments are addressing promising applications for personal health promotion and wellness care in daily life. In this context, visionary concepts such as Personal e-Health, Mobile Health (M-Health), and Wear-care have been recently proposed in technical literature whereas practical home care and disease management practices are gaining acceptance in the healthcare sector.

It seems that future e-care systems will make benefit of technologies such as sensor networks and wireless communications.

Although most discussion has been centred on applications related to the elderly population and chronic patients, future IST integrated care services should provide benefit for all age groups.

New solutions also mean new problems. Changes in technology will drive a shift in how health and social care services should be provided but values matter. New technologies will address many of the technical problems, but some issues lie beyond the technology as part of the new social and relational context of the emerging e-Society. Care services for the elderly, whether health or social, will become an important commodity in the ageing society in most

[6] Monteagudo J.L. and Reig J. (2004) 'e-health and the elderly, a new range of services?' The IPTS Report, Seville, February 2004, pp. 46-53

[7] "Tecnologías de la Información y Comunicaciones y Discapacidad: Propuestas de Futuro". Ed. Fundacion Vodafone. 258 pp. 2004. Madrid. ISBN.: 84-932521-7-9

countries. The traditional caring models are changing rapidly, either social or health related. It is no longer true the clear distinction between different living conditions. Disabled and elderly or elderly and disabled are just a matter of perception after reaching a certain age. The impairments associated with a "normal" ageing situation are on the borderline of disability circumstances. The care plans for such a status should be merely a balance between the health and the social components, varying accordingly to the weight of one or the other.

A comprehensive approach is required to cope with this changing environment. e-Care based model, supported in assistive technology, with their capacity of compound support for social, health and personal care constitute a new promising approach for an efficient integrated care delivery that could improve quality of services and the appropriate allocation of resources.

The process of e-care development in the knowledge-networked society should be characterised by: globalisation of the solutions, the exigency of interoperability and organisational and cultural changes.

Elderly living in foreign countries will be an increasing trend. On the other hand, a greater number of immigrants are working as nursing and caregivers. Inter-cultural and multi-lingual environments must be considered. Systems including automatic translation should be of great value to support communication. Furthermore it must be seriously considered the needs of providing appropriate training for the growing population of immigrants acting as caregivers.

A central issue is how to make ICT potentialities a reality so that e-Health and e-care services can be introduced into real life practice, becoming a commodity for the ageing European Society being something that can be anticipated and correctly planned.

(April 2005)

New Ethics for Nanosciences and the Future of Information Technology?
Let the limits move.

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When addressing the convergence between nanoscience and information technology, we, as individuals taking one modest part in a cultural mosaic, we must admit that we are confronted to the perspective of an increasing *complexity* which, subsequently, opens access to an unlimited universe of *uncertainty*. The potentially unlimited combinations of nanotechnologies and IT from one hand, and, taken together the combinations with biotechnologies and neurotechnologies (I would not address the cognitive sciences in this presentation) on the other hand, increases the perception of uncertainty.

And we, as individuals, feel uncomfortable. Unless a clear-cut ethical code enlightens choices, it is unclear whether the decision to, for instance, make an experiment directly involving, or potentially modifying the information system and the " conscience" embedded in the human body, will involve an emotional state of guilt or not.

As a matter of fact, convergence between nanotechnologies and IT brings all together good, productive and useful applications of nanosciences, for example with repairing medical applications, *and* non desirable or even not acceptable intentions and implementations. It raises the question of risk governance and its dilemma for policy makers, torn between too much protections, or loosing public trust.

Here comes the question of **limits.**

The cultural, professional reaction to this negative feeling is to enter a *routine* attitude, a protective and also professional one, which consists in mapping and assessing risks related to breakthroughs, by following a rigid, once for all established technical guide, who prevents from addressing the *normative ambiguity* related to the way by which we interpret the assessment results.

Of which "routine" do we talk about here?

The one which is referred to as a reassuring, well known, working instruction: "find ***the right equilibrium between risks and benefits***, let institutions put a green light on it, once and for all, and go ahead consequently." What it means is that, depending on the degree of openness related to the scientific and industrial knowledge, the "norm", here, the "limit" between do's and don't, is settled once and for all.

The legal norm itself is linked to the society by the **ethics** this society implicitly adopts and implements. In a democracy, there is a consensus to think that intelligent solutions of problems are preferable to what are usually described as "emotional solutions".

One major difficulty comes with the new ways and means of interaction between technological artifacts and human nature created, or to be created by IT and nano convergence, whose impacts are a matter for public deliberation. If we assume that we have not yet fully defined the nature of human species, (here I do refer to the NEST programme of

DG RDT / European Commission whose title is "what does it mean to be human"), how could we assess "risks" without knowing the whole landscape. Because of this consideration, I should be tempted to follow Pr. Jan Staman, of the Rathenaus Institute, when he explained in a forum dedicated to Science in society in March 2005 in Brussels, that technology assessment and foresight go hand in hand.

Illustrations of potential - if not likely- norms which seem under scrutiny as far as nanotechnology and its meta-convergence are concerned are the following:

- The precautionary principle opens the door to a moratorium as being the new frontier, and refers to the call made in 2002 by ETC group as regards nanotechnology. Hidden philosophy is: "if you don't know it, just let it drop until you know more". The implementation of this principle implies that "regulators" decide for "no adverse effect level" (NOAL), guaranty reversibility of any action and avoidance of irreversible damage. It shifts the burden of the proof to the supply side stakeholders.

- The "duty of care" guideline was raised in the context of the European "REACH"[1] directive negotiation about chemicals production and trade. It could lead to a combination of a legal, hortatory framework and a code of conduct to be implemented on a voluntary basis by suppliers. This is a more pragmatic approach than the one of a strictly applied principle of precaution.

- International legal obligations. For instance, the implementation of the Cartagene convention on biodiversity or of the Kyoto convention related to climate change and sustainable development, creates new international legal constraints for those countries who, on a voluntary basis, agreed to cooperate. In an other specific field, the one of nuclear safety, the international convention opened the door to mutual, peers assessments, with a commonly agreed methodology.

- Prohibition on NBC [2] weapons of massive destruction is a last, but not least, example of the characterisation of a "norm", or "limit".

As those limits are so painful and slow to be imagined, defined, negotiated and adopted, implementation of the limit between do's and don't comes eventually in an environment which can be stable or , on the contrary, may follow a path of quick changes. But then, it is too late to move the limits: whatever the level of knowledge about voluntary or involuntary impacts on health and environment, and whatever the imagination of human beings for experiments, not to mention for terrorist use and abuse, the limits *are* fixed.

Unfortunately, the strict application of the balance between risks and benefits, as a routine commonly accepted by risk assessment and management communities, may be challenged on three main points when we come to try and apply it to nanotechnologies and information technologies.

First, it involves a static approach, not a systemic one: it focuses on linear causalities linking one "event" to its impacts (release of engineered nanoparticles and toxicity/ecotoxicity studies for example); adjustment over time as well as the complexity related to combinations do not fit the risk/benefit approach. Risk here is considered as the "known" uncertainty only.

[1] REACH stands for « Registration, Evaluation and Authorization of chemicals ».
[2] NBC : nuclear, bacteriological, chemical weapons

How to fund research on what "we don't know we don't know", without crossing foresight and a systemic risk assessment methodology?

Secondly, it carries implicit values which we may want, or may refuse to share as such. In a competition-led approach, the hidden philosophy for action is "if you don't know it, just try it". The stakeholders are under pressure of fulfilling the expected rate of return on investment (ROI) which should be, for instance, no less than x%, within no more than (y) months or years. Unexpected impacts are being considered as externalities to be supported by the whole community. In a more balanced approach combining market efficiency with social welfare, the "norm" could be different.

Other values we may not want to share are, for instance, human performance whatever the ethical consequences might be. Converging technologies for improving human performances is the title of an annual event who takes place in the US. The question here is as follows: when convergence between nanotechnologies, information technologies, cognitive sciences and brain biology gives access to enhanced capacities, how do individuals and groups *consider the freedom/ ability to opt in favour of enhancement when confronted to competition, or opt out* if they are "fed up", to refer to the analysis developed by Pr. Sheila Jasanoff of Harvard University, author of "Designs on nature"[3]?

The model suggested by M. William Sims Baindbridge at the NBIC 2004 event was the one of an Artificial intelligence personal advisor, for which an AI system provides personal advice to the individual by simulating a human friend or an advisor. This interaction requires *a significant degree of "personal capture" involving the user*. In this example of convergence, cognitive sciences provide design for judgment and decision-making; IT supplies AI information system; the artifact is based on emotional (physiological) responses and nanotechnology allows nano-enabled extreme portability. Appropriation of such "models" is rooted deeply in a societal bet: "if we build it so they will come…"

Confronted to such models *suggested* to scientifics by the orientation of R&D funding, one cannot avoid the neuroethics questions raised by Sonia Miller: "could the possibility to alter an individual's thoughts and actions be used to forcibly control him in the future?" "Who decides and on what basis?" "What are the safeguards for protecting and disclosing the information?"[4]. I would like to add more fundamental questions around ownership, control and the social ends to which the converging technologies are being directed by those who determine and provide funds for scientific works; who benefits from it/ is potentially harmed by it; who denies or edits out unpredictable and social consequences in the long run; who "takes the floor".

Pr. Alfred Nordmann, rapporteur of the high level expert group on "Foresighting the new technology wave" settled by DG R&D of the European Commission, wrote : " the potential and limits of engineering *for* the mind and engineering *of* the mind need to be determined. Also, the effects on cognitive processes by technical environments should be investigated: if the video game culture has altered how students learn, pervasive artificial environments of the future will have a more profound effect".

[3] JASANOFF Sheila, «Designs on Nature", Princeton University Press, and Science in Society Forum, Brussels, 10th of March, 2005.

[4] MILLER Sonia. "The convergence of C. Legal issues emerge as cognitive science and IT become one". In NBIC Convergence 2004, February 25-27, 2004, New York, NY.

Pr. Jean-Pierre Dupuy elaborated on the paradox that the triumph of scientific humanism brings with it the obsolescence of man: "in mechanizing the mind, in treating it as an artifact, the mind presumes to exercise power over this artifact to a degree that no psychology claiming to be scientific has ever dreamed of attaining. The mind can now hope not only to manipulate this mechanized version of itself at will, but even to reproduce and manufacture it in accordance with its own wishes and intentions. Accordingly, the technologies of the mind, present and future, open up a vast continent upon which man now has *to impose norms* if he wishes to give them meaning and purpose. The human subject will therefore need to have recourse to a supplementary endowment of will and conscience in order to determine, not what he can do, but what he ought to do or, rather, what he ought not to do. These new technologies will require a whole ethics to be elaborated…".[5]

Third criticism, it prevents from recycling immediately the increase in knowledge about effects and impacts. Significant factors who could influence the limits fixed by a given legal framework, such as the classification of scientific information related to strategic and safety issues, or the impact of patents governance, are not to be questioned in the classic risks/benefits assessment methodology.

International cooperation and information sharing use to a be a powerful tool for the public evaluation of an existing legal framework, and can help strongly adapting the norms at international, national and local levels. "Adapting", here, means to let the limits move, towards harder or softer ones for individuals and entities, when and where appropriate.

In summary, the risk assessment approach based upon the balance between risks and benefits is far too limited to answer adequately the societal questions raised by converging transformational technologies, in particular between IT and nanotechnologies. This means that containing risk assessment to this methodology opens the door to disillusions and, unfortunately, to a loosen appointment with the great potentialities of nano and information technologies. Are we rich enough to throw the baby with the bath's water? No, indeed. The ethical deadlock has to be broken in a context already characterized by the emergence of a public opinion trend (not already a "wave"), against all technologies *perceived* as privacy/liberty depriving ones.[6]

We, with Pr. Jean-Pierre Dupuy and Dr. Alexei Grinbaum, would suggest to substitute to this traditional approach of a balance between risks and benefits, which is not as neutral as one would like to believe, another one, more appropriate to nanotechnologies.

This new approach is the one of ***an ongoing normative risk assessment methodology***, because this is the only one which allows us to let the limits move, depending of what we actually, gradually know of the state of the art, its speed and foreseen paths. This concept, supporting a renewed approach, was presented at the Alexandria conference in June 2004, whose aim was to addressing the interest of nations for the elaboration of a responsible international dialogue for nanosciences and nanotechnologies. In particular, considering the limits of a linear and causal approach when assessing nanorisks, has been endorsed by the

[5] DUPUY Jean-Pierre , « The philosophical foundations of nanoethics ». Arguments for a method". Paper presented at the NanoEthics conference, University of South California, Columbia, SC, March 2-5, 2005.

[6] « La micropuce implantable à l'être humain », Signature JAMEH (jamais avec la manipulation électronique de l'être humain, in http://www.forum-social-tarnais.org/Telechargement/Micropuce.pdf 10 p.

participants of this conference involving 26 countries representatives as being absolutely relevant to the nanosciences pervasive applications.

The ongoing, dynamic and systemic methodology for risk assessment should rely on a new tool to be conceived and implemented quickly from local to global levels, with the help of new grids. For the European Union, an important step ahead would be the creation of **a societal observatory of converging technologies,** whose ways and means have already been described as follows:

"The primary mission of this observatory is to study social drivers, economic and social opportunities and effects, ethics and human rights dimensions. It would rely on a standing committee for real-time monitoring and assessment of international converging technologies research. This observatory also serves as a clearing house and platform for public debate. Working groups will deal in multidisciplinarity collaborations with issues of patenting, the definition of commons and the allocation of property rights. The core members in the societal observatory represent policy and ethical perspectives while developing substantial technical and scientific expertise in converging technologies. They serve as intermediaries that bring societal concerns to the research community, and relate research visions to various public constituencies"[7].

I had the opportunity to present this proposal to the European Commission high level expert group dedicated to "Foresighting the new technology wave". It received full support from this group, and also from participants to the "Converging technologies for a diverse Europe" conference, which is heartening. Indeed, the European Commission is never committed to implementing recommendations from an expert group, but should consider the obvious welcome and election of this societal observatory recommendation among the others.

My interpretation of this strong support is that this kind of tool creates a place where visions could be articulated for promises and expectations of the converging information and nanotechnologies at an early stage, and make them the focal point of upstream public engagement[8]. For instance in France, the OPECST, the French equivalent of the European Parliament's scientific evaluation body (STOA), is the only institutional body who provides scientific insights to international dialogues. Is it a stable situation or ought we better considering independent, alternative evaluation centres, coming from NGOs *and* supported by public funding as well, and linked to appropriate networks?

If ethics are to serve, not to stultify society, no ethical decision can be irrevocable, even under uncertainty[9]. Building a share vision upon the foundations of a shared knowledge and a shared renewed risk assessment methodology will contribute to let the normative limits move. An additional rationale in favour of this observatory is the potential bridge it creates with similar institutional dynamics in other continents, and furthermore, an additional incentive for mutual understanding and cooperation of mutual interest between peers.

[7] NORDMANN Alfred, Rapporteur, "Converging technologies – Shaping the future of European societies". Report 2004, HLEG Expert group Foresighting the New technology wave/ European Commission DG R&D, 64 p.

[8] WILDSON James, WILLIS Rebecca, See-through Science Why public engagement needs to move upstream , Demos, London, 2004

[9] HUMPHREY J. H. " A biologist's view of biological warfare", Discussion paper, in Biology and Ethics, edited by F.J. Ebling, Academic Press, London and New York, 1969, p. 138.

In order to give a boost to such a process, several conditions might be fulfilled:

i) awareness of the great potentials of nanociences combined with IT and other fields;
ii) awareness of uses, misuses and abuses and their potential impact on human beings and environment, in particular when related to nanobio new "threats" against populations;
iii) willingness to enter a trusted international cooperation and information sharing of scientific studies about ongoing state of the art reviews and studies related to effects/impacts for better understanding and management of risks, including cognitive sciences and ethics;
iv) orientation of public research programs and funds according to the priority given to observation, massive simulations by international grids, normative risk assessment and long term prospective; an ongoing normative methodology for "nano" risk assessment would be rooted in ELSA (ethical, legal and societal aspects) evaluation criteria.[10]
v) adoption of an appropriate framework to undertake, without delay, first steps in the definition of what should be the typology of criteria supporting the evaluation methodology (from local laboratories of fundamental research to global institutions). This framework should be inclusive (all countries welcomed) and focused both on upstream engagement and accountability to the public.

Taking into consideration the GMO crisis, one can no more admit as trivial the statement according to which ignorance and fear feed the root of the simple refusal by civil society. In fact, the more information was given, the higher the concerns grew because nobody was in a position to address correctly long term effects of GMOs voluntary dissemination. The GMO case constitutes a lesson for the future.

One can say that without a clever upstream input from civil society, the well-balanced and informed dialogues which are required to provide good incentives, funding and orientations to policy makers will simply not occur. Such a situation, if it were to happen in the nano-case, would have the power to prevent the whole society from gathering the nano-harvest where and when there are low hanging fruits in the short run, and eventually lead to huge stranded public and private investments, ending in a loose-loose game.

Our collective responsibility is to let it not happen. But we need to act quickly and explicitly opt in favour of a responsible behaviour.The European Commission has taken the lead to provide a "common house" for the international responsible dialogue in the field of nanosciences and nanotechnologies. But since the approval in September 2004, by the Council, of its communication dedicated to a European strategy in the field of nanosciences and nanotechnologies, stressing the need to strengthen international dialogue, we must admit that we face delays. The December meeting in Brussels organized by DG R&D received green light from the UE members representatives to go ahead, provided that an inclusive approach must be secured. Among the possibilities to organise this dialogue, the Commission proposed to consider the creation of a Carnegie group, following a Canadian informal proposal. Carnegie group refers to G8 research ministers regular meetings.

In fact, if this option were to be adopted, it would take place under the British G8 presidency

[10] Cited by Pr.Jan STAMAN, Forum "Science in society", March 2005, Brussels

which begins in July 2005. Then, everything would have to be done. I have suggested at the meeting of Alexandria that we should consider the kick off, in the short run, of a group whose roadmap would be to work on *simple* common criteria upon which an ongoing normative nano risk assessment methodology could be built, beginning with nanosciences and nanotechnologies, but not limited to them, provided that convergence and its output are the actual societal and ethical challenge. This suggestion has been welcomed by NSF chairman of the National Nanotechnology Initiative Mihail Roco, but delays in finding the appropriate formal framework to implement it prevented from doing it at the international level.

Other initiatives already exist; relying on stakeholders (academia, industrials, insurance representatives) initiatives, on regional or global basis (ICON, GNN for instance). The European Commission Health and consumer protection general directorate has entered a process of intra European networking for toxicology and ecotoxicology risk assessment. All of those dynamics are useful and contribute to a better understanding of what is going on , - and off- the laboratories, but none of them is in a position to fully involve governments in a process of identifying their responsibilities and subsequently evaluate the appropriate limits and/or incentives to be chosen and implemented.

In the outcome of the open consultation on the European strategy for nanotechnology, published in December 2004, the chapter "risk and regulation" received the following answers: "**Health and safety issues, toxicology, risk management/assessment, and establishing regulation were highlighted as crucial issues for which more R&D is needed.** A wide span of views were given, including one respondent who asked for a complete moratorium on lab-research until compulsory safety protocols are introduced as well as a strict "no patents" policy on new molecules. Among those who were positively minded towards nanotechnology, the patenting issue was addressed by asking for "one EU patent".[11]

This same month of December 2004, was issued within the 6th framework program / thematic area 3 related to nanotechnology and nanosciences, knowledge-based multifunctional materials, new production processes and devices, a work program who identifies certain topics related to our concerns, i.e. long term interdisciplinary research into understanding phenomena, mastering processes and developing research tools for converging technologies, and also the interaction of engineered nanoparticles with the environment and the living world. An ***ethical review*** **of proposals** will be provided, along the lines of a guideline to be followed by the corresponding panel.

In particular, for research involving human beings, the ethical review panel will assess the information given to participants, the measures taken to protect participants' personal privacy and data, including genetic ones, recruitment criteria and the level of care offered to participants.[12]

As a matter of fact, I am now convinced that we will have to wait for the 7th Framework program to see, eventually, a call for tenders related to the societal observatory described *supra*. It will not be too late, but it will be late to give good and early European insights to the international dialogue for a responsible development of nanotechnologies and nanosciences.

[11] "*Outcome of the open consultation on the european strategy for nanotechnology*". December 2004, 106 p. , in http://www.nanoforum.org

[12] " *Integrating and strengthening the european research agenda*", Thematic area 3. Work program, Edition december 2004, p. 42.

European members will have to rely, in between, among their own national capacities to elaborate, separately, their own methodology, if need be.

May be the *forum of national ethics councils*, established to implement action 32 of the Science and society EU action plan,[13] whose expected outcomes are to help pan-European dialogues on ethical, legal and social implications of science and technology in general, could help to speed up, and also to recognize that ethical and social dilemmas are increasingly relevant for nanotechnology, neurosciences, pervasive computing and artificial intelligence, and should be considered as relevant distinct sets from the now classical bioethics.

I would like to end this presentation by one observation.

In November 2004, the department of Cybernetics of the University of Reading (Berkshire, UK), became part of the European Network of Excellence (NoE) of the 5.5 M€ "Future of identity in the information society" (FIDIS) European project. Headed by Pr. Kevin Warwick, who experimented an RFID implant under the project known as Cyborg 2.0, this department describes itself has having considerable experience in the evolution of Cyborg entities (linking humans and technologies together) as well as tagging and tracking issues, especially through implant technology, and in ambient intelligence environments.

It stresses as a matter of specific interest the *contrast* found between the evolution of identity perception in collective Cyborg scenarios and the typical concept of self. Among the outcomes of this FIDIS European research program, legal, socio-economic, usability and application requirements were foreseen. On the 21st of January 2005, the case study outcome[14] was issued as a set of actually interesting scenarios, but no developments and foresight of nano and IT convergence were introduced, even if the ethical questions raised by RFID applications in general, were analysed.

This observation, for me, indicates clearly that the legal, societal and ethical questions raised by nanosciences when combined with IT , neurosciences and neurotechnologies, being sensitive enough not to be left behind by European research, are not, in the present situation, taken on board.

We need to build a robust implementation by the European Commission of ethical principles. Its willingness to lead the dialogue at international, governmental level, aimed at establishing a framework of shared principles for safe, sustainable, responsible and socially acceptable development and use of nanotechnology, has a price: in time investment in the appropriate toolboxes, scientific, technical and relational ones, such as a societal observatory, aimed at *enlightening and securing* public and private decisions who weigh the most in the long run.

Sometimes, the best opportunities for a win-win responsible policy is to let the limits move.

*) The opinions expressed in this article commit the author only.

[13] Science and Society Action Portfolio. Today's science for tomorrow's society. European Commission Projects, in http://europa.eu.int/comm/research/society2005.html

[14] FIDIS Future of Identity in the information Society. "Set of use cases and scenarios". Main editor Thierry Nabeth (collective) 21st January 2005 83 p. in http://www.fidis.net

Scenarios for the Development of the Knowledge Society in Poland

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In this paper we will provide a brief characterisation of selected aspects and phenomena of the information society (IS) in Poland, including the current state-of-the-art as well as new trends and IS-related phenomena, which emerged after the country's EU accession in May 2004. With the GDP growth of 5.4% in 2004 and a massive rise of exports to the EU, Poland outperformed earlier expectations and made optimistic long-term development scenarios more realistic. The overall positive economic climate has fostered the development of such attributes of the IS as the internet access, e-government services, and Polish content growth on the web.

The paper bases on a report, which has been prepared for FISTERA recently. The aims of the underlying report were to catch elements of new trends, processes, and phenomena and describe those aspects and activities, which were considered in less detail in previous studies performed for the Commission, rather than to present a complete image of the Information Society in Poland. It should moreover assist in finding these topics, aspects and areas, which are worth further, more penetrative studies. Specifically, the analytic part of the report, which provides potential scenarios, SWOTC (with Challenges as a complement to Opportunities and Threats) and priority analyses, and recommendations to the decision-makers, is reported here in full. The paper catches the situation and data available until April 30, 2004.

ICTs and privacy – technological trends and future dilemmas

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ICTs are becoming ever more integrated into both public and private life – from using smart cards to access public health services to using hotspots to surf the Internet wirelessly. However, in spite of the far reaching benefits these technologies can bring, the increasing accessibility and quantity of personal data available on individuals has potentially serious implications for individual privacy.

There are many ways ICTs can lead to privacy infringements. Individuals can be surveilled, often without their knowledge. Personal data could be obtained by third parties with or without individual consent, potentially leading, for example, to discrimination by insurance companies or employers, or to an increase in spamming and targeted marketing. Even if none of these occur, the psychological impact of loss of privacy, as yet poorly understood, may be substantial.
The European Parliamentary Technological Assessment (EPTA) Network is conducting a review of how ICTs impact on individual privacy. The review considers the potential "trade-offs" between privacy and the benefits of ICTs - from increased safety, security and crime prevention to more efficient use of public services, economic benefits, and enhanced social interactions.

The aim is to draw together relevant studies carried out by EPTA partners to date (which range from literature reviews and desktop research to focus group studies and consensus conferences), in order to identify common issues of concern, and highlight areas for future consideration, as well as to compare attitudes towards ICTs in different European countries.

A key issue raised in the course of the review is the accessibility of current Privacy Enhancing Technologies (PETs). Although there are limitations to the extent to which PETs could combat the surveillance potential of ICTs, PETs can offer protection against commercial data collectors. However, the average user finds them very hard to use. A 'privacy divide' is forming between those who are privacy aware and act accordingly, and those who do not, and remain vulnerable.

Incorporating PETs into large IT projects, for example in the provision of public services, clearly has economic implications. However, studies indicate that the cost of including PETs is marginal if incorporated as part of the initial design process, but can be significant if they are incorporated into already existing systems.

Another issue raised is the extent to which individuals must sacrifice personal privacy in order to participate in social and economic life. At the moment an individual can maintain a degree

[1] The European Parliamentary Technology Assessment network (EPTA) is a trans-European network of organisations performing science and technology assessment (TA) studies, to advise parliaments on the possible social, economic and environmental impact of new sciences and technologies. see www.eptanetwork.org

of anonymity or pseudonymity simply by avoiding the use of mobile phones or the internet. However, as ICT devices become smaller, more powerful, and more easily networked, this situation may change.

In future, intelligent devices may be embedded in our surroundings. Such devices could be used to offer services and information unobtrusively. However, they could also be used to monitor people's activities, to form personal profiles. The potential for maintaining anonymity would be much reduced as individuals might not know whether they were being surveilled.

Ambient technologies could contravene current principles of data protection. Under current regulations personal data may only be collected if the individual consents, and can only be collected for a purpose determined in advance. However, if intelligent devices were embedded in the environment, continuously collecting data, it might not be possible to abide by these principles.

The development, implementation and enforcement of legislation relating to ICTs is by no means straightforward, due to their rapid development and widespread use. Recent legislation shows a trend towards increasing security and reducing the risk of crime, often at the expense of privacy. One example is the regulation of traffic data storage: the Cybercrime Convention of the Council of Europe in 2001 allows for extended authorisation of wiretapping of internet communications and transborder exchange of data. It will also allow for retention of traffic data. This convention came into force in 2004 and will be transferred into national law. This marks a trend away from storing traffic data only for as long as necessary for billing purposes.

Studies carried out by EPTA partners show that attitudes to ICTs and privacy amongst the general public vary depending on the country and the age groups, as well as the application in question. Some applications of ICTs, such as electronic health records, are regarded positively, as a means of empowering patients. Others, such as surveillance technologies (e.g. CCTV), are often treated with scepticism and generate concern over the potential for "big brother" scenarios.

Studies also show that there is a low public awareness of the privacy implications of releasing personal data to third parties. When using the internet, people are often unaware of the traces they leave behind. Many users are prepared to give up their personal information for a relatively low return – for example a gift, or free SMS messages; privacy policies are rarely read in full.

It is widely accepted that effective protection of privacy requires effective legislative measures, self-regulation and technical solutions as well as increased public awareness and increased transparency and openness. How to achieve this, while realising the benefits of ICTs, will remain a subject of widespread debate as these technologies become ever more prolific

Extremadura Region Strategy on Information Society.

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The Regional Government of Extremadura, has been a pioneering element in working for the attainment of social cohesion, economic development and technological advancement, i.e. creating a more competitive region with social cohesion, thanks to the advances of technology and processes arising from Regional Project of the Information Society

The Regional Ministry of Infrastructures and Technological Development have worked on incorporating the region into the Information Society ensuring a democratic access to new technologies, based on the certainty that in the future - now almost the present - full exercise of a citizen's rights will be only possible if they have an active identity through ITCs.

This is precisely one of the successes: obtaining the development of our regional project with the construction of Information Society, launching an up-to-bottom strategy involving small villages, small and medium-sized companies, non-governmental and non-profit-making organisations and tertiary sector entities. Our general intention has been to reach people, organisations and sectors that will later access this revolution.

The strategy is nowadays concreted by the following projects:

Regional Intranet:
The regional Intranet is a complete communications infrastructure which has allowed the connection of over 1,400 points throughout the 383 municipalities via 2Mb. Broad Band. The Intranet connects all the public building of Extremadura, including schools, administrative buildings and hospitals.
A new program to extend the Intranet has been launched in 2005, and will provide broadband access to privates entities and citizens in places where the private providers are not present.

Education Technology Network:
The ETN implies the integration of the Knowledge Society in the Education System of Extremadura. From the beginning of the 2003-2004 academic year our schools have been equipped with 66,286 computers, with a ratio of one PC per two students in all secondary school classrooms. This implies connection among all schools and to the internet to facilitate the exchange of e-Content among the educational community.

Digital Literacy Plan:
More than 90,000 people have participated in this learning process in 34 New Centres of Knowledge (KNC) spread throughout the region in rural areas and in the most disfavoured neighbourhoods in big cities.

Vivernet:
Vivernet is a business incubator of technologically based enterprises. At present 104 business initiatives are receiving support, 178 business plans have been drawn up and training and business contacts have been put at the disposal of 7033 users.

gnuLinEx FLOSS strategy:
gnuLinEx was launched in 2002. This strategic action consists on the distribution and use of an operating system and its own applications based on Free software programs (FLOSS), as a reinforcement of the key technological projects in the Region in order to sustain the rest of the projects.

The first version was developed by a company in cooperation with hundred's teachers. The system is actually implemented, tested and improved by the R&D team of the Regional Ministry of Infrastructures and Technological Development. This team is continuously in contact with the Education Community in order to response their needs Consequently the ratio of a PC for two pupils in secondary education and a PC for five pupils in primary education were reached, which mean that 66.289 computers work with gnuLinEx, 183.000 pupils and 16.000 teachers using this alternate software to enhance the educational community technological literacy.

The gnuLinEx project entailed the creation of new companies and business in content development and applications based in free software, and more widely of a new regional market. Because the applications developed are based on a system which can be copied, modified, distributed and used freely, they can easily be adapted to concrete needs of sectors or users and transferred to other sectors.

The gnuLinEx has been transferred to other regions. In April 2003 a cooperation protocol was signed between the Presidents of the Junta (Regional Government) of Extremadura and the Junta (Regional Government) of Andalusia, establishing mechanisms of cooperation for the development of new applications and dissemination and support activities for free software, materialising in the launch of the project GUADALINEX in Andalusia, in June 2003.

In the international sphere, gnuLinEx will be transferred to other administrations and entities such as the City Council of Porto Alegre and the National Institute of Information Technologies of Brazil. In addition, the Ministry of Education and the Ministry of Culture of Brazil, India, Costa Rica and universities in Argentina and Chile have also shown an interest in this distribution.

This project was given the 1st place award in a competition organised by the European Commission and the Committee of Regions under the theme "e-Europe-Regio: the information society at the service of regional development"

The gnuLinex impact has been as follows:

INDICATOR	IMPACT
1.-Investment made in purchasing equipment, furniture, and wiring for secondary schools	**61.3 million Euros**
2.-Number of hits on the LinEx website (www.gnulinex.org)	**16,618,710 million**
3.-Distribution of the LinEx Cd	**210.000**
4.-Number of LinEx downloads	**More than 80,000**
5.-Dissemination of LinEx in congresses, sessions, etc.	**95**
6.-Number of New Knowledge Centres	**33**
7.- Number of quality applications based on GNU/LinEx	**10**

INDICATOR	IMPACT
8- Number of companies working with LinEx	**50**
9.-Courses, workshops on LinEx	**85**
10.-Computer/pupil ratio in Primary Education	**1 computer / 5 pupils**
11.-Computer /pupil ratio in Secondary Education, High School and Professional Training	**1 computer / 2 pupils**
12.-Number of schools with LinEx	**589**
13.-Number of computers in education centres	**80.000**
14.- Support activities for teachers	**269**
15.-People made technologically literate	**260.000**
16.- www.gnulinex.org registered users	**More than 8,500 users**

gnuLinEx is completed today with a distribution designed for SMEs and is the base of the Extremadura eHealth system.

The challenges for Europe and the role research institutes can play

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The challenge

What is the challenge we are facing today? While Europe traditionally has had strong and internationally present companies in telecommunications and networking, we have to a large extent failed to be a dominant player in the computer hardware and software market. If you look at the Belgian situation, you can see a large R&D presence of companies such as Alcatel, Siemens, Philips and others but the US multinationals that dominate the IT part of the ICT equation (IBM, Microsoft, Oracle, HP to name a few) are largely present only with sales and customer service operations. The nineties bubble was a worldwide phenomenon and we had some local success stories but in the subsequent shake-out a large amount of local software start-ups have gone under. Furthermore it is clear the applications market is not only going through a consolidation phase, but also changing its business model from a license to a service driven one, which poses the particular challenges of a maturing market. There are exceptions to the rule, let us not forget Nokia and SAP for example, but one cannot deny the United States was the dominant player in this field in the nineties and till today. We are also facing a number of issues in trying to make up some of the lost ground. The risk-averse nature of our local capital markets, the fact that new companies find it harder to reach a large market as easily as their American counterparts and the fact that our universities and academic institutions have tended to be less market and company oriented are the most important ones.

In my opinion there is, however, also a window of opportunity that presents itself. While it has been in the works for a while, one can now truly say we are seeing a convergence happening in our sector where communication, information and media are meeting each other in a digital world. This is shaking up the marketplace once again, and opens opportunities for consumer electronics and communication companies to grab a part of that new market in which they compete with their IT counterparts. It also offers start-ups opportunities to capture emerging niche application markets both in the consumer and business sectors. It certainly poses challenges for the operators that see fundamental shifts in their business models. The next phase of ambient intelligence and ubiquitous computing takes this convergence a step further: even more different technologies and disciplines need to be combined to create successful products, and markets get even more intertwined.

Possible contribution of research agencies

I will use as an illustration of how I think research agencies can contribute, the Interdisciplinary Institute of Broadband Technology, a research institute that has recently been established by the Flemish government. Our institute focuses on R&D in the Information and Communication Technology (ICT) sector and in particular on the development of new broadband applications. The mission of the IBBT is to form highly competent human capital and conduct multidisciplinary research to the benefit of both industry and government.

One can ask why we do need research institutes like the IBBT in this context. Can the market not take care of itself and will resourceful entrepreneurs all over the world not ensure the

customer gets what he needs or wants? I beg to differ. Prior to taking this job, I worked in the private software sector for close to 20 years, primarily for American companies. When I took this job, I informed one of my (American) ex-colleagues of this. He is now running a company that helps US start-ups professionalize their sales and marketing approach and introduces them in the global market-space. When he jokingly said everything in Europe revolves around government intervention, I replied we did not have a DOD in Europe. He laughed and acknowledged that 3 of the 5 start-ups he was helping to get to the next phase, were living off DOD contracts. While I do not believe we should emulate the way the US influences the development of new markets, we do need to be aware of the fact we need to be able to compete in a global marketplace. That's the philosophy behind IBBT. The most important principles it is based on are:

1. The institute is market-driven. It attempts to capture what the market, in its broad sense, will need for the next decade and does this together with local and international companies that compete in that market space. It bundles the available competences in our universities to create new applications in a focused way. It does away with the often artificial divide between research and development.
2. It is based on the concept of clustering. The networked economy requires us all to work together. Our innovation platforms bring together small and large companies to do joint research and hopefully continue that cooperation in commercial alliances. Enlarge the cake is the message here, rather than compete for a small local piece.
3. It has an international perspective. While the IBBT, by its nature and span of operation, will focus on performing research resulting in local reference pilots initially, its research groups have a long tradition of working on a European scale and its aim is to help companies compete globally.

Conclusion

While I brought you the specific perspective of a small region in a large world, I believe however that a lot what has been said also applies to the rest of Europe. In my mind there are three key success factors in order for Europe to succeed:

1. Scale is crucial and therefore we will only continue to be a competitive region if we cooperate on a European scale
2. Speed is the second, one should think in timelines of months not years
3. Pragmatism is the third one (and linked to success factor 2), Europeans tend to be too theoretical in their approach.

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IST Visions and Foresight: A perspective from the future

Geoff Woodling

Theme:
How far had Europe progressed towards the Information Society by 2005? Was there any evidence that it really was moving towards a Knowledge Society or what were the visions for Europe's future? How has IST contributed to realising their vision over the past 20 years?

A Futureality

Last week the price on eBay for one of the first London parking meters to be retired 20 years ago, in favour of a wireless payment system in early 2005, reached $500. Their electromechanical technology had a distinctive style that makes them attractive as retro alarm clocks. Today, we can see that their demise was among the first signals of what the so called "information society" was to become.

It is amusing to remember at the time that wardens, or "meter maids" as some called them, continued to check each parked car to see whether a fee had been paid to park in the bay. It was soon realised that with the widespread use of in-car real time information services, which enabled the driver to find the empty bay on their locator system, it was possible to detect remotely the position and identity of the car and the fee paid to park in the space. In time, most of the roadside clutter that used to be called road furniture also became redundant, as drivers had no need to look for signs or even at maps – not that they would know how to use them now!

It was just a matter of time before no more meter maids! The loss of jobs in many such services was what frightened Europeans in those days. The rejection of the so-called "Bolkestein Directive" in 2005 symbolised the fear in Europe that low wage competition would destroy much more than "meter maid" jobs. The "information society" came to be a convenient villain, when "information jobs" in the office economy were exported overseas. It was identified more with the decline of the former industrial society it would displace, than with the future "knowledge society or economy" it might herald. Instinctively politicians tried to pretend that the "service economy" was indeed the foundation of a knowledge society, when as we have seen it was for many in the office economy, its victim.

Elsewhere in the world at that time, perceptions of change were rather different. In Japan it had long been accepted that the "knowledge economy" embraced high technology manufacturing. It was also clear to many in Japan that one of the biggest opportunities to develop leadership in the knowledge economy would be in finding ways to replace dependence on unskilled labour to provide the services needed by a rapidly ageing population. In a country with high social cohesion and few immigrants, Japan demonstrated that the benefits of eliminating many physical services jobs could sustain an ageing society, and create wealth in ways different from those in America.

If the US epitomised the information society, it was because it had created it. The rapid deindustrialisation of America was, in reality, a global shift of production to Asia, accompanied by a locational shift towards a "new" domestic economy in the south and west, which had scarcely been industrialised. There, development of the Information Society Technologies (IST) underpinned the transition to the post industrial economy and society,

which eventually occurred in all other advanced societies, including Europe. US investment in the development of digital technologies and their software applications by 2005 far exceeded that of the rest of the world. The speed with which American firms took advantage of IST to relocate production led to rapid price deflation of the material economy, much to their economic advantage. The result surprised most futurists. America was able to capture the benefit of her enormous investment in the knowledge base to reverse the long decline in the quality of place and local life, in many desolate communities, which many later identified as the real spur to resurgent religious fundamentalism. The popular saying "Jesus didn't drive a truck" summed up the shift from hyper materialism.

For Europe the challenge had been to demonstrate that it could compete in creating a knowledge society, as they called it then, within a cultural context far more mixed and open than in Japan, but far more rigid, culturally protective and secular than in America. Oddly the parking meter story was a signal of the way Europe moved towards the future. Europe began to benefit from the deflation of the material economy from the start of the millennium, spurred by the huge rise of Asian industrial exports. At first it appeared a threat, most of all to those still employed in Europe's dominant industry, the automotive sector. But in Europe, the demand for mobility and with it more cars and space which they needed, were all but impossible to meet within the strict environmental standards, mandated from 2005 in European cities. These led to the suspension of private vehicle use in several German cities later that year. Without irony, a spokesperson for the industry commented that the problem was not the vehicles, but the time drivers spent in them! Buy cars but don't use them, it seemed, yet it was to be almost the opposite, use as needed, but don't buy.

The "meter maids of Munich" were not needed, when vehicles were no longer able to park in the city. People's travel behaviour had to change, just as it had in London. And that is what happened. Fewer than half the numbers commute to fixed places of work in the office economy today as then. Communications combined with the IST's behind the huge explosion in the volume and velocity of "information" used in the office economy, swiftly led to a transformation of the marketplace. There were few limits to using IST's to capture and relay real time information within areas hitherto in the public domain: the "commons" of old, mostly by way of machine to machine communication. Congestion was the mother of invention that delivered the benefits of installing the kind of ubiquitous real time sensory information systems, which today locate and inform us, in our wireless information environment. The red London bus, a hundred year old mass transit system, was unable to compete with T-POTT, The Personal On-Time Taxi.

2005 had marked the start of the economic and social transformation that we refer to now as the Quaternary, logically the term for what follows the tertiary or service economy. The meter maids may have been a convenient historical signpost, but their fate illustrates how individuals were made aware of the costs they impose on society through their use of the "commons". From that, it was a short step to recognising that organisations needed to deliver the means for individuals to work with a far more profound knowledge of their surroundings, to pursue their own lifestyles in many different situations. The Quaternary today is what many then called the "sustainable society", but who also failed to recognise the warning of the threat to individual freedom, such ubiquitous knowledge posed. It was an emerging Economy of Order.

Creating Value in a Digital Era: Exploring the Experimental Economy
(How Do Wealthy Nations Stay Wealthy?)
BRIE Working Paper 165*

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The distinctive features of the current era, the global and the digital, are changing the mechanisms for creating value. Firm internal functions suddenly become products to be bought in the market, products that generated premium prices suddenly become commodities, and the sources of differentiation for products and production processes evolve. It is not just that there is an increased pace of change, but that the market environment is inherently less predictable.

The influence of the digital revolution is visible in the productive economy, through the evolution in how we make and distribute goods and services. The relevant historical sequence begins with American dominance in mass manufacture and continues, through challenges to mass manufacture in the form of Japanese lean production and European flexible specialization or diversified quality production. The paper examines in detail the dynamics of the digital/global or the transition from an electro-mechanical age to the digital era. Each phase involved different business problems, a different role of the "abroad" in the dynamics of the national economy, and a different emphasis on the state's role in the economy.

The digital era can be best characterized by two elements: Wintelism and Cross National Production Networks (CNPNs). *Wintelism* as a code word points to the strategic shift in competition away from final assembly and vertical control of markets by final assemblers. It reflects the sudden importance of the constituent elements of the product in the final market competition: the Windows operating system and Intel processors are examples. Hence the name, Wintel.

This digital era is best characterized by a new set of distinctive tools, Tools for Thought. "Information technology builds the most all-purpose tools ever, tools for thought… These tools for thought amplify brainpower by manipulating, organizing, transmitting, and storing information in the way the technologies of the Industrial Revolution amplified muscle power." The tool set rests on a conception of information as something that can be expressed in binary form, and manipulated. It consists of the hardware consisting of equipment that executes the processing instructions, the software consisting of written programs including procedures and rules that guides how the hardware equipment processes information; data networks that interlink the processing nodes, and the network of networks, that together create a digital community and society. The digital tools constitute a leading sector that has reshaped the economy as a whole. Demand for the products and services made possible by the new digital technology have been part of growth and transformation in the advanced economies in the latter part of the 20th century.

In a sense, this chapter asks the question of how wealthy nations stay wealthy amidst radical changes in competitive markets. I argue that traditional tools of strategy and policy analysis will not suffice. We have to consider the place of conscious experimentation in corporate and national adaptation. Firms must create differentiated products for which the customers will pay premiums and differentiated processes that can create distinctive ad vantages. What can companies do in an era of hyper competition when everything threatens to become a commodity? The answers will not be arrived at in a straightforward way. A traditional analytic

approach to strategy will only be a starting point in the process of corporate adaptation. Companies will have to look at their initiatives as "experiments," attempts to find their way through a maze of uncertainty. They will need to learn how to evaluate their own experiments and interpret experiments of others.

In moving towards the experimental corporation and the experimental economy it is necessary to consider the implications for the corporation, economic policy and the political dynamics on which policy rests. Each company effort, and each effort of a competitor, must be culled and systematically assessed for lessons. Governments must consider what an "Experimental Economy" will require, and how an environment can be created for individual firms and networks or clusters of firms to experiment effectively.

* This Working Paper will be the preface to: How Revolutionary was the Revolution? National Responses, Market Transitions, and Global Technology in the Digital Era, A BRIE/ETLA/Helsinki Project. John Zysman and Abraham Newman, Editors. Stanford University Press, Forthcoming 2005 – 2006.